TO: David Oord, ARAC Chair
FROM: Jackie Spanitz, ACS Handbook Subgroup Chair
DATE: November 6, 2024
SUBJECT: Handbook recommendations for December 2024 ARAC Meeting
Pilot's Handbook of Aeronautical Knowledge (FAA-H-8083-25)
Weight-Shift Control (FAA-H-8083-5)
Helicopter Flying Handbook (FAA-H-8083-21)
Helicoper Instructor Handbook (FAA-H-8083-4)
Glider Flying Handbook (FAA-H-8083-13)

On behalf of the Aviation Rulemaking Advisory Committee's (ARAC) Airman Certification System Working Group (ACSWG), I submit the following recommendations for the:

- *Pilot's Handbook of Aeronautical Knowledge* (FAA-H-8083-25C), intended publication date June 2025.
- *Weight-Shift Control Handbook* (FAA-H-8083-5C), intended publication date June 2025.
- *Helicopter Flying Handbook* (FAA-H-8083-21B) and *Helicopter Instructor Handbook* (FAA-H-8083-4). The ACSWG reviewed the current editions to facilitate creating the scope of work and timeline for production of a new edition. No ETA for publication date of new editions.
- *Glider Flying Handbook* (FAA-H-8083-13B), intended publication date December 2024

Consistent with the recommendations made for the FAA Guidance Documents Vision submitted July 2 2015, we appreciate the FAA now providing a production schedule for all FAA Handbooks (FAA-H-8083 documents). Additionally, it would be helpful to know the projected timeline for the next revision (i.e. how long do you anticipate the new editions of each title to remain in effect, 2 years, 5 years, etc.). Doing so will allow the training community to plan for and update material to ensure training and testing remain correlated, as well as provide feedback in a timely way to help with continued development of this title and the other FAA handbooks.

With the Incorporate by Reference (IBR) rulemaking now in effect, we anticipate any new handbook edition will correlate directly to an ACS. The process to look something like this:

1. ACS Published – task elements define the expected knowledge.
2. Handbook Published – task elements supported with scope and breadth of ACS task elements.
3. FAA Knowledge Exams updated, supported with Change communications – public sample exams and Airman Testing Briefing describe the test changes so training and testing remain correlated.

The ACSWG and its members welcome the opportunity to provide feedback and thank you for this opportunity. Please let us know if we can provide anything further.

Sincerely,

Jackie Spanitz, ACS Handbook Subgroup Chair
General Manager, Aviation Supplies & Academics, Inc.

Pilot's Handbook of Aeronautical Knowledge (FAA-H-8083-25C, September 2024 Draft Edition)

Original files ACS WG reviewed:
FAA Handbook Drafts - ACS WG Reviews

ACS WG review with comments found in folder with same name:
FAA Handbook Drafts - ACS WG Reviews

General Comments

- This important reference defines the base expected knowledge for all crewed pilots operating within the National Airspace System (NAS). It applies to all airman certificates and ratings and all aircraft categories. This handbook should be reviewed for update every 2 years, with a new edition published no less than every 5 years to ensure the guidance is consistent with current procedures, rules and equipment.
- It is difficult to identify new content or required knowledge which will be tested on from a handbook new edition. A handbook summary of changes, revised ACS, and change communications associated with all knowledge exam revisions should accompany handbook revisions.
- The figure images appear too small in the Word documents. I think/assume they are only thumbnail representations, but it is worth mentioning. The images need to be larger in the final publication in order to see and read what's being depicted.
- Subscripts are not applied correctly. And also inconsistently incorrectly. In many cases, what should be a subscript is appearing as a superscript (V speeds, etc.). Review handbook throughout.
- Check the track changes and the comments within the chapter files in the ACS WG Review with Comments folder. Chapter 1 had a number of errors not found in the other chapters.
- The Angle of Attacked Work Group (AOA WG) identified recommended changes in the PHAK related to Angle of Attack/Angle of Attack Indicators. Generally, the AOA Theory was addressed thoroughly in the PHAK, although we identified a few minor changes. We believe an AOA Indicator is a critical life-saving safety tool for airplanes and found areas that needs to be expanded upon in this Handbook. Unfortunately, they did not have the time to write the specific language to be inserted in the areas identified. Their team has committed to accomplish this quickly, with additional direction and support. The PHAK Chapters where we identified the specific sections related to Angle of Attack Theory/Angle of Attack Indicators where either new or expanded language or Figures are recommended for change are found in Chapter 2, 3, 4, 5, 8, 9 – see the marked up files with these comments. The AOA WG is standing by to support next steps and are very excited to be part of this process. They wish they had a little more time to have prepared a complete response with suggested proposed language on the first round.
- Substantial lack of information pertaining to drone operations. Crewed pilots should understand the regulations surrounding drone operations and where they can expect them to be operating. Below is the only line I was able to find pertaining to anything drone related.

  Key 9802 - no

  For more information regarding unmanned aircraft systems (UAS) refer to 14 CFR part 107.
- Chapter 2, suggest removing – refer to Risk Management Handbook (8083-2) instead.
- Chapter 7, Fuel Grades - This section has not been updated to account for substantiable aviation fuels and unleaded fuels. Outdated fuels like 80 should be removed as they are just about impossible to find anywhere in the USA.

- Chapter 8, Electronic Flight Displays - Expanded discussion on how each of the six basic flight instruments function on EFDs. The air-data computer is briefly discussed but does not expand on how that information is used to display information on the instruments.
- Chapter 8, Angle of Attack Indicators - Expanded discussion on how an angle of attack indicator actual works, basically discuss the system and what different components make up AoA indicator system. Lack of discussion on how to actually interpret AoA indications.
- Chapter 9, Certificate of Aircraft Registration - Should be noted that an aircraft registration certificate is valid for a period of seven years.
- Chapter 12, suggest removing – refer to Aviation Weather Handbook (8083-28) instead.
- Chapter 13, suggest removing – refer to Aviation Weather Handbook (8083-28) instead.
- Chapter 13, Area Forecasts (FA) - The information in this section is way outdated. FA are only issued for Gulf of Mexico and Caribbean, Hawaii, and Alaska all other regions have been replaced by the GFA. The example used in the text to decipher an FA does not even exist anymore.
- Chapter 13, Weather Depiction Charts - These charts were discontinued and are no longer being tested on. This section should be removed.
- Chapter 15, Military Training Routes - Add information regarding Special Military Activity Routes (SMARs) which have recently been added to the AIM.
- Chapter 16, VOR/DME - Information is outdated, there are updated VOR standard service volumes not discussed, VOR Low and VOR High. In addition, updated SSV for DME Low and DME High. No mention of VOR Minimum Operational Network.
- Chapter 16, Lack of discussion on performance-based navigation (PBN).

Weight-Shift Control Handbook (FAA-H-8083-5A, August 2024 Draft Edition)

Original files ACS WG reviewed:
FAA Handbook Drafts - ACS WG Reviews

General Comments

- This important reference defines the base expected knowledge for all pilots operating weight-shift control category aircraft within the National Airspace System (NAS). This handbook should be reviewed for update every 3 years, with a new edition published no less than every 5 years to ensure the guidance is consistent with current procedures, rules and equipment.
- It is difficult to identify new content or required knowledge which will be tested on from a handbook new edition. A handbook summary of changes, revised ACS, and change communications associated with all knowledge exam revisions should accompany handbook revisions.
- The figure images appear too small in the Word documents. I think/assume they are only thumbnail representations, but it is worth mentioning. The images need to be larger in the final publication in order to see and read what's being depicted.
- Subscripts are not applied correctly; they consistently appear as ~ (for example C~L for C_L). Maybe these will be transcoded into subscript in the final publication?
- A general comment specific to the MOSAIC rulemaking: ensure the 8083-5 is revised to incorporate the impactful changes this rulemaking will bring when the scope of a WSC aircraft and operating privileges are expanded from the existing category and definition of Light Sport Aircraft. There will be impacts to the expanded endorsements and privileges under this rulemaking that a Sport Pilot CFI can instruct towards in a LSA WSC aircraft at the sport pilot and Private Pilot level. Recommend contracting with an active Sport Instructor for these revisions.

Helicopter Flying Handbook (FAA-H-8083-21B)
Helicopter Instructor's Handbook (FAA-H-8083-4)

Edition ACS WG reviewed:
https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/helicopter_flying_handbook
https://www.faa.gov/sites/faa.gov/files/regulations_policies/handbooks_manuals/aviation/FAA-H-8083-4.pdf

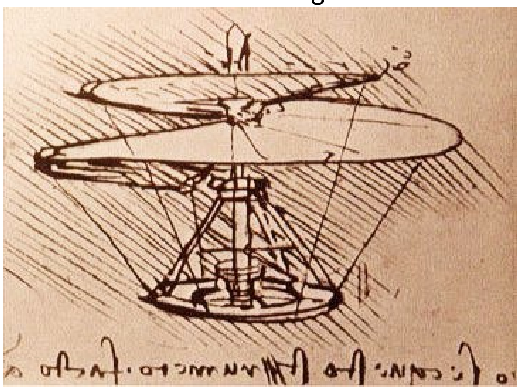
General Comments

- The *Helicopter Flying Handbook* is an important reference that defines the base expected knowledge for pilots operating helicopters within the National Airspace System (NAS). This handbook should be reviewed for update every 2 years, with a new edition published no less than every 5 years to ensure the guidance is consistent with current procedures, rules and equipment.
- The *Helicopter Instructor Handbook* should be discontinued, as much of it repeats what is in the *Helicopter Flying Handbook*. This 8083-4 is not a source or reference for any helicopter knowledge test questions. Aside from the redundant technical information, there is some good instructional information that should be moved to the 8083-21 in the form of "Instructor Tips" as well as the "Techniques" and "Common Errors."
  - A general comment specific to the 8083-4 content and the MOSAIC rulemaking: ensure the Helicopter Instructor's Handbook is revised to incorporate the impactful changes this rulemaking will bring when Helicopters are a new category of Light Sport Aircraft and a Sport Pilot CFI can instruct in a LSA Helicopter.
- It is difficult to identify new content or required knowledge which will be tested on from a handbook new edition. A handbook summary of changes, revised ACS, and change communications associated with all knowledge exam revisions should accompany handbook revisions.
- From Tim Tucker, supported by Nick Mayhew: … the *Helicopter Flying Handbook* (FAA-H-8083-21B) should undergo a complete revision. I was on the Working Group responsible for the Handbook's 2019 revision (work was actually done in 2017 but the publication date is 2019) which was a review of text only. At the time we identified the need for a more complete future revision that would include updating out of date and incorrect figures, correcting terminology, aligning the handbook with the upcoming ACS and incorporating new information important to the helicopter community. This new revision project was begun in late 2020 under the guidance of Richard Orentzel from AFS-630 (Richard has since retired) and continued through Jul 2021. The Working Group went through a section by section review and had completed up through chapter four when work was stopped for the same Ex Parte reasons the ACS process was halted. I hope the FAA still has the product we produced because I feel it was a vast improvement over the 2019 revision. As an example, the revision we made to chapter one regarding the history of the helicopter which included new figures/pictures is found in Appendix 1 of this document. As mentioned above, the most important need is to update the helicopter handbook to reflect the new helicopter ACS (private, commercial, instrument ATP and flight instructor) that became effective in May 2024. The ACS changed many terms, added tasks/maneuvers, modified techniques and changed task standards – all of which need to be reflected in a revised handbook. This is a big job that needs to be accurate and complete. Myself and the Robinson Helicopter Company look forward to helping the FAA with this task that is so important to the helicopter training/testing world.
- As part of the 2020-2021 ACS WG review of 8083-21B, Nick Mayhew submitted an extra chapter on simulation which we still think should be added to the document. Hopefully this chapter and other word remain in FAA records, last supported with Richard Orentzal.

Appendix 1: ACS WG Review of 8083-21A Chapter 1, completed in 2019

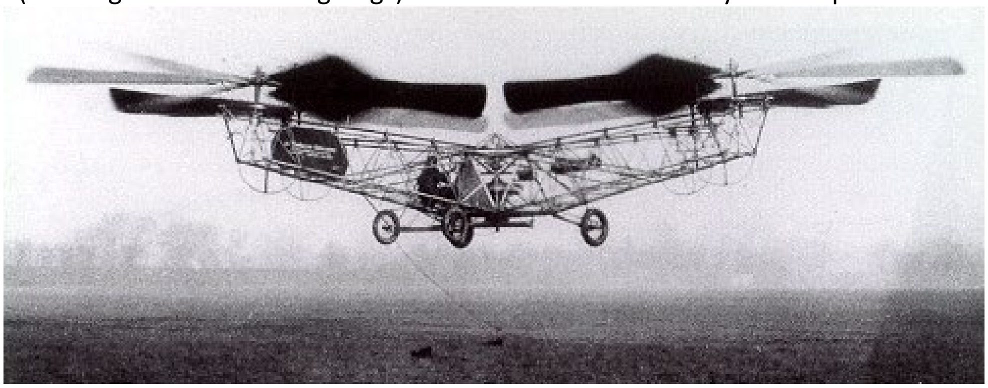
Helicopter Development

The history of rotary wing development is long and complex, with many contributors from many parts of the world. Leonardo da Vinci is credited with early helicopter designs with his human powered "aerial screw" in the late 15th century. His theory of rotating a linen aerial screw fast enough to push or compress the air enough to lift a structure off the ground is similar to today's helicopters.



Da Vinci's aerial screw drawing

Frenchmen Launoy and Bienveno are generally considered to have built the first working helicopter model in 1784. This design had a set of counter rotating feathers which canceled torque and is a design still in use today. Their demonstration at the Paris World's Fair opened designer's eyes to what could be as their model rose to almost 70 feet above the ground. During the 19th and early 20th centuries designers such as England's Sir George Cayley, Italian engineer Enrico Forlanini, and others throughout Europe and the US refined their designs to increase lift and counteract torque. However, they all lacked a powerplant capable of producing the needed horsepower for sustained manned flight. The breakthrough came with the introduction and refinement of the internal combustion engine. During the first quarter of the 20th century numerous varied designs with much more powerful engines were tested around the world. Paul Cornu's 1907 design had dual 20 foot rotors powered by a 24 hp engine enabling him to become the first man to hover in true helicopter flight, although it lasted only a few seconds. By the 1920s engines producing well over 100 hp were available and designs with dual rotors, coaxial rotors and even quadrotors were tested. For example, George de Bothezat's 1923 helicopter had four rotor systems, each with six blades and was powered by a 190 hp rotary engine. Three were built for US Army evaluation but never went into production. The first vertically mounted tail rotor, powered by its own 80 hp engine, was developed by Dutch aviation pioneer Albert Gillis Von Baumhauer in 1930. Another advancement in this design was his use of a collective and cyclic control using a swashplate principle (rotating and non-rotating rings) which is still in use in today's helicopters.



George de Bothezat's prototype for the US Army

Albert Gillis Von Baumhauer's 1930 design with the first vertical tail rotor. Note the main rotor engine far forward while the smaller tail rotor engine is far aft.

The first practical, fully functional helicopter is considered to be the Focke-Wulf FW-61, designed by Heinrich Focke, Germany's foremost designer, in 1937. In 1938, Hanna Reitsch the first female helicopter pilot demonstrated the FW-61's capabilities in the Deutschlandhalle, a large indoor arena in Berlin. The FW-61 went on to set every international helicopter record for duration, distance, altitude and speed. A few years later, after two unsuccessful designs, Igor Sikorsky, a Russian immigrant to the US, settled on a single main rotor and single, vertically mounted tail rotor model called the VS-300. The VS-300 broke Focke's endurance record of 1:20:49 by 12 minutes and this design became the predominate helicopter configuration throughout the world. An upgraded variant of the VS-300 called the VS-316, later the R-4, became the world's first mass produced helicopter in 1942 earning Igor Sikorsky the title "Father of the US Helicopter Industry". The R-4 was the first helicopter used in the US military and set all helicopter altitude, endurance and speed records.

Sikorsky VS-300

Sikorsky R-4

As with the airplane development, war provided the need, money and fortitude for the United States to take the lead in the technological advancement of the helicopter. Although World War II produced a steady but slow advancement, it was the Korean Conflict that demonstrated the helicopter's real potential. By the end of the Conflict in 1953 the helicopter was being used for everything from search & rescue, to resupply, to its most famous mission: medical evacuation. American designers like Arthur Young at Bell Aircraft Corporation, Stanley Hiller, Frank Piasecki and Charles Kaman continued to expand the helicopter envelope throughout the late 1940s through the 1950s. However, it was in the Vietnam War where helicopters became an indispensable military asset to the point where the war is commonly referred to as "the Helicopter War" and the helicopter cemented its place in our aviation culture. Almost 12,000 helicopters were deployed during the Vietnam War and the venerable Bell UH-I (Huey) accumulated over 10 million flight hours, becoming the iconic symbol of the conflict.

The post-World War II Soviet Union also made a significant contribution to the helicopter's development. In the 1950s and 60s, Nikolai Ilyich Kamov designed a number of helicopters using coaxial rotors, rotating in opposite directions and mounted one on top of the other. This design, which is still in use today, had both civilian and military applications. However, the most notable Soviet designer was Mikhail Leontevich Mil who was as important to Russian helicopter development as Sikorsky was in the United States. His Mi-1 design first flew in 1947 and became the first large scale Soviet production helicopter. Yet, unquestionably, the most successful Mil helicopter is the Mi-8. Since its first flight in 1961, over 10,000 civilian and military variants of the Mi-8 have been built and it is still in production today.

Kamov Ka-226

Mil Mi-8

As in the early part of the 20^{th} century, engine development spurred this giant step in helicopter development demanded by the military need. The introduction of the turbo-shaft engine, a form of gas turbine, provided a significant increase in the horsepower to weight ratio over the reciprocating or piston engine. This benefit of more power at less weight more than made up for the penalty of increases in cost and fuel consumption. Although the first turbine powered helicopter appeared in 1951 with the Kaman K-225, the first production turbine helicopter, the SA-313 or Alouette II, was made by the French state owned aircraft manufacturer Sud Aviation in 1956. The first flight of the Alouette II was in March 1955, but just three months later test pilot Jean Boulet established a new helicopter altitude record of 26,932 feet to demonstrate the Alouette II's turbine engine's capability. By the 1980s turbine powered helicopters were commonplace around the world.

However, the piston equipped helicopter began resurgence in 1979 when Frank Robinson introduced the Robinson R22, followed by the R44 in 1992. Instead of increasing engine RPM to produce more horsepower, as was commonly done to the piston engines of the 1950s & 60s, Robinson used a slightly larger engine than necessary then derated the engine by reducing the RPM and limited the usable horsepower. This resulted in a higher altitude capability, increased reliability and higher component life. Both models have set speed, altitude and endurance records in their respective classes and became the largest selling civilian helicopters in the world.

The helicopter's unique ability to take off and land vertically and hover for extended periods of time insures its continued growth and development. Emerging technologies, changing military needs and advanced aerodynamic designs will expand the capabilities of the next generation of helicopters in both the manned and unmanned arenas.

Glider Flying Handbook (FAA-H-8083-13B, September 2024 Draft Edition)

Original files ACS WG reviewed:
FAA Handbook Drafts - ACS WG Reviews

General Comments

- The *Glider Flying Handbook* is an important reference that defines the base expected knowledge for pilots operating gliders within the National Airspace System (NAS). This handbook should be reviewed for update every 3 years, with a new edition published no less than every 5 years to ensure the guidance is consistent with current procedures, rules and equipment.
- It is difficult to identify new content or required knowledge which will be tested on from a handbook new edition. A handbook summary of changes, revised ACS, and change communications associated with all knowledge exam revisions should accompany handbook revisions.
- The figure images appear too small in the Word documents. I think/assume they are only thumbnail representations, but it is worth mentioning. The images need to be larger in the final publication in order to see and read what's being depicted. I'll reiterate that figures should be large enough and clear enough to be legible. It is difficult/impossible to do a thorough review when the draft images are small and/or low-res. There could be errors in the figures themselves, or there could be inconsistencies between the text and a figure, but many of them are too hard to see.
- The way regulations are cited seems unusual. Below is just one example Key. To list both the part number and the section number is redundant and out of the ordinary. Would suggest either 14 CFR §61.56 or 14 CFR section 61.56 (plus lettered/numbered subparagraphs as needed). Note: this is how the regulations were cited in the FAA-H-8083-25C so maybe this is how the FAA is citing regs going forward?

  Key 9690 - no

  Rated pilots should compare continuous training and practice to 14 CFR part 61, section 61.56(c)(1) and (2), which allow for training and a sign-off within the previous 24 calendar months in order to act as a pilot in command.

  Many astute pilots realize that this regulation specifies a minimum requirement, and the path to enhanced proficiency, safety, and enjoyment of flying takes a higher degree of commitment such as available using 14 CFR part 61, section 61.56(e). For this reason, many pilots keep their flight review up to date using the FAA WINGS program. The program provides continuing pilot education and contains interesting and relevant study materials that pilots can use all year round.

- The NE in V_{NE} should be subscript. The instances highlighted below do not have the ~ that indicates subscript formatting. I suggest a search for all V speeds throughout the handbook to ensure the subscript format is applied.

  2 **Effect of Altitude on VNE**
  7756

  Key 25806 - no

  The never-exceed speed (VNE) decreases with increased altitude due to the possibility of flutter at higher true airspeeds. At high altitudes maintaining a speed at or below the red line may exceed actual VNE. Since the decrease in VNE varies by model, the flight manual may include a table, such as the one shown in Figure 4-9, that documents the decrease in VNE with altitude. At high true airspeeds during a rapid descent, the glider structure could suddenly flutter and break apart. Glider manufacturers test for flutter and adherence to VNE speeds published in the flight manual for the specific make and model should prevent it.

Key 25807 - fi

Figure 4-9. IAS corresponding to VNE decreases with altitude.

- Figure 5-1 is the same density altitude chart used in 8083-25C. However, It differs from CT-8080-2H Figure 8 and results in different answers between the 2 charts. The paragraph preceding Figure 5-1 (key 32674 shown below) is an example using the chart, so the paragraph and the image will need to match if changed.

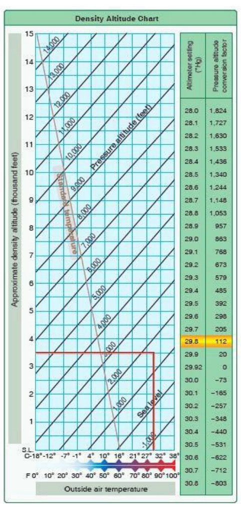
Key 32674 - no

A chart provides one way to determine density altitude. [Figure 5-1] For example, knowing field elevation of 1,600 feet MSL with a current altimeter setting of 29.80 "Hg and temperature of 85 °F, what is the density altitude? The right side of the chart provides an adjustment for nonstandard pressure (29.80 "Hg) and suggests adding 112 feet to the field elevation. This step provides a current pressure altitude of 1,712 feet. The next step involves tracing a line vertically from the bottom of the chart from the temperature of 85 °F (29.4 °C) that intercepts the diagonal 1,712-foot pressure altitude line. The final step involves tracing a line horizontally to the left from the interception point and reading the density altitude of approximately 3,500 feet. Under these conditions, a self-launching glider or towplane will perform as if at 3,500 feet MSL on a standard day.

Key 32675 - fi

Figure 5-1. Density altitude chart.

Image Key 3634



Editorial Comments

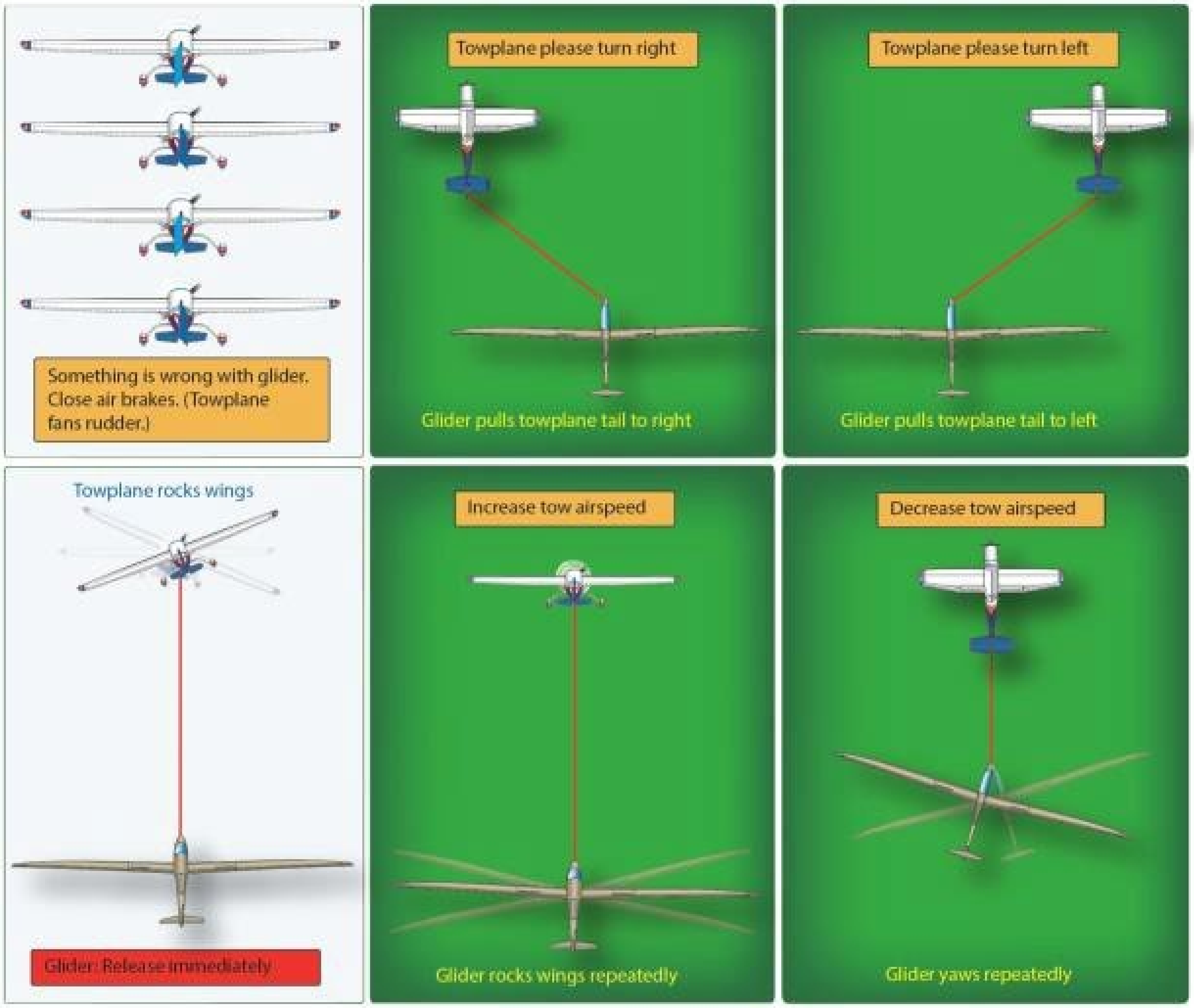
Key 32916 - fi

Figure 7-2. Inflight aerotow visual signals.

Image Key 3698

In Figure 7-2 when the glider slides to the left of the tow plane it is the signal for the towplane to turn to the right and vise versa.

********** Correction Towplane Turn Left Towplane Turn Right *****************



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Chapter 1 – Keys 3
Key: 20910-no
Current text: " … including an FAA-approved glider school, college or university, or soaring club. ..."

Suggested text: "… including a FAA-approved glider school, privately owned commercial glider school, or college, university or private soaring club. ..."

Justification: the existing text is an incomplete list of places pilots can receive glider flight training. It misses the 2 largest organizations, private commercial schools, operating under part 61, and private soaring clubs. Leaving them out does a disservice to the glider community.

Key: 20910-no
Current text: "… These should have FAA-certified flight instructors who can provide instruction. ..."

Suggested text: "… These will have FAA-certified flight instructors who can provide instruction. ..."

Justification: Only FAA-certified flight instructors can provide flight/ground instruction, while FAA-certified ground instructors can provide ground instruction. The current text implies that some of these organizations may have non FAA-certified flight instructors providing instruction. This is NOT correct, and it is not correct to imply it is possible.

Key: 20911-no

Current text: "… and other students can reveal the pros and cons of choosing a particular school. ..."

Suggested text: "… and other students can reveal the pros and cons of choosing a particular club or commercial school. …"

Justification: Most of the flight instruction in gliders occurs in the club environment, not in commercially operated schools. The current text ignores this fact and would severely limit a candidates options if they read this to think that a commercial school is their only option. Candidates should also feel comfortable looking at various club operations when making these types of decisions.

Chapter 2 – Keys 5, image keys 2

Key: 20976-no

Current text: " … On the other hand, a negative flap position results in reduced lift and drag."

Suggested text: "… On the other hand, a negative flap position is used to allow the glider to operate in high speed cruise flight while maintaining a relatively small pitch attitude thereby reducing parasitic drag."

Justification: the current text is an incomplete description of negative flap usage. Glider pilots use negative flap settings only in cruise flight where the higher speed, at a given AoA, provides the additional lift needed to maintain controlled flight at this higher speed. Without negative flaps the pilot would have to lower the pitch attitude, to operate at a given AoA and speed to achieve the same amount of lift needed to maintain controlled flight.

Key 20997 and Image Key 948

Current Text and Image: Figure 2-9. A Grob G109B touring motor glider.

Recommended Text and image: Figure 2-9. A Pipistrel Sinus touring motor glider.

Justification: While the Grob G109B is a fine example of a TMG, the Pipistrel Sinus is more representative of the current generation of TMG's. With advanced instrumentation and even electric motor capabilities, they represent the future of TMG soaring.

Key: 20999-no

Current text: "Some gliders have sustainer engines powered by either electricity or gasoline. …"

Suggested text: "Some gliders have sustainer engines powered by electricity, gasoline or jet fuel. …"

Justification: There are now gliders equipped with turbo jet engines that burn jet fuel. They are a small, but growing, population in the glider community and should not be left out of this discussion.

Key: 21000-fi, image key 950

Current text: "Figure 2-11. A motor glider with the sustainer engine mast extended."

Suggested text: "Figure 2-11a. A Schleicher ASG-29 E with gasoline sustainer engine mast extended.

Then add new text and image: Figure 2-11b. A Schempp-Hirth Ventus-3FES motor glider with a front engine sustainer (FES) system."

Justification: FES based gliders are becoming increasingly popular and it would be good to show a picture of one of these gliders.

Key: 51208-no

Current text: "… into the wind more easily, in addition, a CG hook makes the glider more susceptible to kiting (climbing above the tow plane) which threatens the safety of the tow pilot."

Suggested text: "… into the wind more easily."

Justification: While it is true that a glider can kite on aerotowing when the glider has a CG hook. It is not true that such a glider is more susceptible to kiting. Kiting is a function of the glider pilot mishandling the flight controls, typically due to a distraction. It would be better to discuss kiting issues in the Aerotow chapter or abnormal/emergency procedures chapter.

Chapter 3 – Keys 6, image keys 2

Key 22012-no

Current text: "… Doubling airspeed quadruples the amount of lift. As air density decreases with increasing altitude or rising temperature, lift decreases."

Suggested text: " … Doubling airspeed, while holding the angle of attack constant, quadruples the amount of lift. As air density decreases with increasing altitude or rising temperature, lift decreases."

Justification: The amount of lift the wing produces would only increase if the CL (AOA) remained constant. In a glider doubling the speed means lowering the AOA to increase the descent angle.

Key 57047-no

Current text: "… As shown in the figure, Wp balances lift, while Wf balances drag during an unaccelerated descent."

Suggested text: "… As shown in the figure, Wp balances lift, while Wf balances drag during an unaccelerated descent. Thus gravity is the external engine that pulls the glider forward by acting on Wf."

Justification: The text needs to clarify that it is this Wf weight (mass X gravity) that drives the glider forward.

Key 22039-no

Current text: "One specific point appears in Figure 3-6 above. ..."

Suggested text: "One specific point appears in Figure 3-7 above. …"

Justification: Typo, pointing to the wrong figure.

Key 22082-no

Current text: "… A glider in flight with a load factor of one does not necessarily mean the glider is in straight-and-level flight, but rather that the total lift equals that of unaccelerated straight-and-level flight."

Suggested text: "… A glider in flight with a load factor of one does not necessarily mean the glider is in straight flight, but rather that the total lift equals that of unaccelerated straight flight, i.e. a constant pitch attitude (airspeed)."

Justification: Gliders do not typically fly straight-and-level. They do fly straight-and-constant descending flights.

Image Keys 979 and 978

Current images are almost identical. The only difference appears to be the light green box around the horizontal axis text "Angle of bank (degrees)" in 978.

Suggested action: update 979 to remove the dotted black lines so this graph shows how the G load increases with increasing bank angle. Or delete 979, key 22091-fi, and update key 22090-no to only reference figure 3-16. This change would require updating the 5 following figures (3-18 to 3-22).

Justification: clarity, why have 2 identical images?

Key 22093-no
Current text: "… Therefore, if the airspeed of the glider were doubled, the radius of the turn would be four times greater. …"

Suggested text: "… Therefore, if the airspeed of the glider were doubled and the bank remained constant, the radius of the turn would be four times greater. …"

Justification: The text needs to show that only 1 variable (bank angle or airspeed) is changed. The current text does not make that clear.

Key 22114-no
Current text: "… During landing in gusty conditions, pilots normally increase the approach airspeed by half of the difference between the steady wind and gust value to maintain a safe margin above stall. For example, if the winds were 10 knots gusting to 16 knots, it would be prudent to add 3 knots ((16 – 10) ÷ 2 = 3) to the approach speed."

Suggest text: "… During landing in gusty conditions, pilots normally increase the approach airspeed by half of the steady wind and all the gust value to maintain a safe margin above stall. For example, if the winds were 10 knots gusting to 16 knots, it would be prudent to add 11 knots ((10 ÷ 2) + (16 – 10) = 11) to the approach speed."

Justification: Matches guidance in chapter 5 and provides a sufficient margin to deal with gusts and wind gradients.

Chapter 4 – keys 6, image keys 4

Key: 25795-fi, image key 1836
Current image: picture of a typical airplane ASI

Suggested image: picture of a typical glider ASI

Justification: This is the Glider Flying Handbook. It should images and text that describes what the glider pilot sees. The current image shows the bottom of the green ark stopping at 40 kts and having a small unmarked gap between 0 and 40 kts. All glider ASI's have indications and markings below 40 Kts (much like helicopter ASI's) reflecting their lower stall speeds. Additionally glider ASI's may wrap past 360 degrees so it is important that the GFH show a glider specific ASI, not some airplane specific instrument.

Key 25809-no

Current text: "… Degradation due to age and vibration may also affect the sensitivity of the diaphragm. …"

Suggested text: "… Degradation due to age may also affect the sensitivity of the diaphragm. …"

Justification: The glider has little or none of the vibrations found in airplanes. A major source of vibration is the internal combustion engine driving the airplane. Without this engine the vibrations are not a factor and should not be referenced as a factor in pitot system operation or degradation.

Key 35870-no

Current text: "… The principles of operation resemble those of the altimeter. …"

Suggested text: "… The variometer can be considered a simple flow meter measuring air flowing between an outside reference (static or total energy port) and an internal reference flask. …"

Justification: As noted in key 25874-no text, the vario responds to a difference in air pressure found inside a reference chamber (flask or capacity bottle) and the outside air (static pressure or total energy pressure). A typical vario does not have a diaphragm with a calibrated leak allowing air pressure to equalize. Instead a typical mechanical vario will have a vane placed in a curved chamber. This vane is directly connected to a needle and is balances such that the airflow moves the vane in response to the changing pressure (air flow). The Winter instrument company has supplied us with a cutaway picture of their vane type vario that we can publish in this handbook.

Key 35870-no

Current text: "… A non-electric variometer uses a separate insulated tank …"

Suggested text: "… Both electric and mechanical variometers typically use a separate insulated tank …"

Justification: As noted above, variometers are flow meters, and thus must have some type capacity (internal or external) to operate. Mechanical varios have vanes or other physical objects are are placed in the path of this airflow. Electronic varios may have pairs of electrically heated thermisters placed in the airflow such that uneven heating of the pair can be used to determine which way the air is flowing and thus a climb or descent is indicated. Due to the volume of air needed to drive these instruments, an external capacity flask is used. Other electric varios use pressure differentiation to determine how quickly, and in which direction, the pressure in the reference chamber is changing to drive the indicator. These instruments may have internal capacities as the volume of air needed to drive the sensor is less.

Key: 25873-fi, image key 1853

Current image: shows diaphragm based vario with components labeled

Suggested action: replace image showing diaphragm connected to mechanical linkage and gearing with image showing a vane based image based on the Winter variometer cutaway provided. The components also need to be relabeled as noted.

Capacity flask: correct and keep
Vertical speed: correct and keep
Static pressure inlet: correct and keep
Capillary hole: incorrect, remove text box no replacement

Linkage and gearing: incorrect, remove and no replacement
Diaphragm capsule: incorrect, remove and replace with “vane in air channel, directly connected to display needle.”

Justification: Modern variometers are not similar or based on diaphragm based Airspeed or vertical speed instruments. They are a unique glider specific instrument that operate as simple flow meters. That is, they detect and measure the air flow created by a pressure differential between the pressure inside the capacity flask and the pressure measured at the static port or the Total Energy port. A modern mechanical vane type vario is what should be displayed in this handbook.   A cutaway view of a modern mechanical vario is provided by Winter Instruments and may be published in this handbook.

Key: 25875-fi, image key 1854
Current figure: shows diaphragm variometer with text describing instrument at a constant altitude.

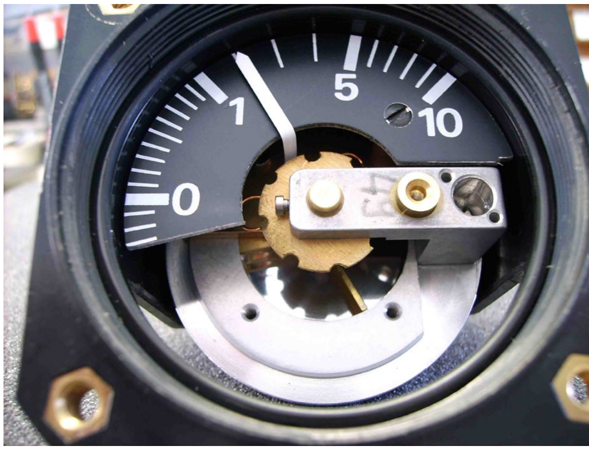
Suggested figure: replace image with same one based on image key 1853 with new test in the green boxes
Box 1: correct and keep text
Box 2: incorrect and not needed, simply repeats what box 1 says.
Box 3: incorrect, replace text with “The vane is not deflected and the needle points to zero.”

Justification: As noted in key 25874-fi justification, the image is wrong and replacing it with the image from that key requires changes to the text in the green boxes. The text in the blue boxes is correct and can remain.

Key: 25876-fi, image key 1855
Current image: same as previous comment, shows incorrect diaphragm based variometer and text.

Suggested image: replace with version based on image key 1853 with text in green boxes as
Box 1: correct and keep
Box 2: incorrect, remove as there is no storage capacity inside the instrument case
Box 3: incorrect, replace with text “The pressure of the air inside the capacity flask begins to flow out of the flask, past the vane, causing it to deflect driving the needle to display a climb.”
Box 4: incorrect, replace with text “As the climb continues, the pressure inside the capacity flask remains slightly higher that the static pressure causing a continuous flow of air deflecting the vane and displaying a climb.”

Justification: Same as justification for Key 38576-fi and image key 1854



This is an exploded view of the inside of a mechanical vane type vario. Note that the vane, small brass rectangle in air channel, is directly attached to the needle.s It can be used to correct draw the images in keys 1853, 1854, and 1855. The FAA also has permission from the Winter Instruments company to post this picture as well.

Key: none, text missing
Current text: missing

Suggested text: insert following key 25923-no
“While gliders are exempt from carrying transponders and ADS-B out transmitters in most – but not all - airspace, the Soaring Society of America strongly encourages pilots to install this equipment when operating near high density airspace. This increases our visibility to other users of the National Airspace System (NAS).”

Justification: Gliders and glider pilots operate in the NAS just like other aircraft and pilots. When operating in high traffic areas, glider pilots can make their aircraft more visible to other NAS users by having equipment that they can ‘electronically see’. Modern transponders and ADS-B transmitters are not as power hungry as older equipment meaning that it is less of a burden to have these instruments installed. Noting that this is a SSA recommendation will highlight this for the soaring community.

Chapter 5 – keys 10, image keys 1

Key 32690
Current Text: “When flying straight and level and following a selected ground track, the pilot can point the glider into the prevailing wind as the preferred method to correct for wind drift….”

Recommended Text: “When flying straight following a selected ground track, the pilot should fly a heading that results in the glider pointing into the prevailing wind as the preferred method to correct for wind drift…..”

Justification: Gliders are incapable of level flight under normal conditions.

Key 32692
Current Text: “In any case, the pilot generally aims for a spot past the threshold of the runway to provide a safety factor if the approach ends up shorter than expected.”

Recommended Text: “In any case, the pilot generally aims for a spot past the threshold of the runway to provide a safety factor that accounts for the effects of the wind gradient or other factors that may cause the approach to be shorter than expected.”

Justification: Failure to account for the wind gradient is a major factor leading to a shorter than desired landing or a hard landing, both of which can cause injury or damaged to the pilot and aircraft.

Key 32694
Current Text: "The pilot usually expects any headwind to diminish during descent to a landing. If the change occurs abruptly, the pilot may experience a sudden airspeed loss. After the pilot lowers the nose to compensate, it takes a finite time interval to overcome the inertia of the glider and regain airspeed. A significant speed loss near the ground may preclude recovering any or all the lost speed."

Recommended Text: "The pilot usually expects any headwind to diminish during descent to a landing. This is called the Wind Gradient. If the Wind Gradient is abrupt, the pilot may experience a sudden airspeed loss. After the pilot lowers the nose to compensate, it takes a finite time interval to overcome the inertia of the glider and regain airspeed. A significant speed loss near the ground may preclude recovering any or all the lost speed. A wind gradient on final approach may cause the glider to land short of the point of intended touchdown therefore, a closer approach may be necessary."

Justification: Failure to account for the wind gradient is a major factor leading to a shorter than desired landing or a hard landing, both of which can cause injury or damaged to the pilot and aircraft.

Key 32727
Current Text: "The GFM/POH provided by the manufacturer contains glider performance information. The GFM/POH lists specific airspeeds such as stall speed, minimum sink airspeed, best L/D airspeed, maneuvering speed, rough airspeed, and the never exceed speed (VNE)."

Recommended Text: "The GFM/POH provided by the manufacturer contains glider performance information. The GFM/POH lists specific airspeeds such as stall speed, minimum sink airspeed, best L/D airspeed, maneuvering speed, rough airspeed, maximum aerotow speed, maximum ground launch speed, and the never exceed speed (VNE)."

Justification: Maximum aerotow and ground launch speeds are placarded airspeeds and essential to know to prevent overstress of the glider tow hook mechanism.

Key 32785
Current Text: "Removable trim ballast weights, often made of metal, attach to a ballast receptacle incorporated in the glider structure. These weights compensate for a front seat pilot who weighs less than needed to maintain the CG within acceptable operating limits. The ballast weight mounted well forward in the glider cabin can move the CG within permissible limits with the minimum addition of weight."

Recommended Text: "Removable trim ballast weights, often made of metal, attach to a ballast receptacle incorporated in the glider structure. These weights compensate for a front seat pilot who weighs less than needed to maintain the CG within acceptable operating limits, or to meet the minimum seat load requirement of the glider.. The ballast weight mounted well forward in the glider cabin can move the CG within permissible limits with the minimum addition of weight."

Justification: Most modern European manufactured gliders have a minimum seat load of 154 lbs (70 Kg) that must be complied with regardless of any manual CG calculation.

Image 3654

Recommended Image:

Justification: Show image of modern vented filler cap with internal workings shown.

Key 32772-ul
Current text: "Empty weight 600 lb"

Recommended text: "Empty weight 669 lb"

Justification: The table in image key 3652 shows the empty weight at 669, the text in this un-number list must match.

Key 32782-no
Current text: "… The next step is to find the sum of all weights (980 pounds) including the empty weight of the glider. …"

Recommended text: "… For the glider multiplying 669 pounds by 93.7 inches yields 62,685 inch-pounds. The next step is to find the sum of all weights (1039 pounds) including the empty weight of the glider. …"

Justification: The table in image key 3652 shows the total weight a 1039, not 980 as used in this paragraph.

Key 32700 - no
Current text: "When approaching to land during windy and gusty conditions, a pilot normally adds half of the difference between the steady wind and gusts to the approach speed to mitigate any variations in airspeed. Instead of holding the glider off the ground for a low kinetic energy landing during these conditions, the pilot can land a little faster than normal. Upon touchdown, extending the air brakes prevents the glider from becoming airborne from a gust during the landing roll."

Recommended new text: "When approaching to land during windy and gusty conditions, a pilot normally adds half of the steady wind and all of the gusts to the approach speed to mitigate any variations in airspeed. Instead of holding the glider off the ground for a low kinetic energy landing during these conditions, the pilot can land a little faster than normal. Upon touchdown, extending the air brakes prevents the glider from becoming airborne from a gust during the landing roll."

Justification: This is a Soaring Safety Foundation recommendation it ensures the glider has sufficient energy (speed) to deal with any decrease due to the changing winds.

Key 32734 - no
Current Text: To determine the best speed to fly for distance in a headwind, the pilot can shift the origin to the right along the horizontal axis by the speed of the headwind and draw a new tangent line to the polar. For tailwinds, the pilot shifts the origin to the left of the zero mark on the horizontal axis.

Recommended new text: To determine the best speed to fly for distance <u>over the ground</u> in a headwind, the pilot can shift the origin to the right along the horizontal axis by the speed of the headwind and draw a new tangent line to the polar. For tailwinds, the pilot shifts the origin to the left of the zero mark on the horizontal axis. <u>This technique should be used during the final glide.</u>

Justification: This change is to emphasize that this will maximize the final glide into a headwind.

Key 32735 - no
Current text: Figure 5-12 shows an example for a 20-knot headwind. The new tangent indicates 60 knots as the best glide speed. By repeating the procedure for different headwinds, the data show that flying faster as headwinds increase results in a greater distance traveled over the ground. Analysis of the data from many gliders leads to the following general rule: the pilot can add half the headwind component to the zero wind L/D to obtain maximum distance.

Recommended new test: Figure 5-12 shows an example for a 20-knot headwind. The new tangent indicates 60 knots as the best glide speed. By repeating the procedure for different headwinds, the data show that flying faster as headwinds increase results in a greater distance traveled over the ground. Analysis of the data from many gliders leads to the following general rule: the pilot can add half the headwind component to the zero wind L/D to obtain maximum distance <u>over the ground.</u>

Justification: See above comment.

Chapter 6 – keys 5, image keys 1

Key 32819 - ol
Current text: Registration

Recommended new text: Current Federal Aircraft Registration

Justification: To clarify the information

Key 32820 - ol
Current text: Required placards

Recommended new text: Required Aircraft Placards and Instrument Markings

Justification: To clarify the information

Key 32832 - no

Current text: Once a glider has been completely assembled and before flight, the pilot inspects all critical areas to ensure completion of all flight control attachments. Many manufacturers provide a critical assembly checklist (CAC) for use after assembly. A positive control check (PCC) provides an additional means of verification that should occur even if appropriate personnel complete a CAC. The pilot should refer to a written checklist provided by the manufacturer or a commercial source that accurately reproduces glider checklists.

Recommended new text: Once a glider has been completely assembled and before flight, the pilot inspects all critical areas to ensure completion of all flight control attachments and proper assembly of the wings and tail structures. Many manufacturers provide a critical assembly checklist (CAC) for use after assembly. A positive control check (PCC) provides an additional means of verification that should occur even if appropriate personnel complete a CAC. The pilot should refer to a written checklist provided by the manufacturer or a commercial source that accurately reproduces glider checklists.

Justification: To clarify the assembly procedure.

Key 32848 - no

Current text: If expecting strong winds, pilots can tie the spoilers open with seat belts, or place a padded stand under the tail to reduce the angle of attack of the wings. When securing the glider for an extended period, gust locks on the control surfaces prevent them from banging against their stops. Pitot tube and total energy probe covers prevent entry of insects or debris. [Figure 6-4]

Recommended new text: If expecting strong winds, pilots can tie the spoilers open with seat belts, or place a padded stand under the tail to reduce the angle of attack of the wings. When securing the glider for an extended period, gust locks on the control surfaces prevent them from banging against their stops and potentially causing damage. Pitot tube and total energy probe covers prevent entry of insects or debris. [Figure 6-4]

Justification: Clarification of what could happen if control locks are not used.

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Key 32822

Current Text: “Personnel preparing to assemble a glider should consider the following elements: location, number of helpers, tools, parts, and checklists that detail the appropriate assembly procedures. The GFM/POH should contain checklists for assembling and preflighting a glider. If not, personnel should develop one and follow it. Glider pilots should avoid distractions that may occur during assembly and check for required documents on board the glider.”

Recommended Text: “Personnel preparing to assemble a glider should consider the following elements: location, number of helpers, tools, parts, and checklists that detail the appropriate assembly procedures. The GFM/POH should contain checklists for assembling and preflighting a glider. If not, personnel should develop one and follow it. Glider pilots should avoid distractions that may occur during assembly and check for required documents on board the glider. As a glider pilot, you will receive training in proper assembly and disassembly per FAR 61.87(i)(13).”

Justification: Reference FAR 61.87 to emphasize importance of this procedure.

Key Image 3682
Recommended Image:


Justification: Update image to show modern sailplane and trailer configuration.

Chapter 7 – Keys 7, image keys 2

Image Key 3698
Current image: in flight signals

Suggested image: Update image to reverse the text in the 2 upper green boxes.

Justification: The 2 upper green images are incorrect. They are mis-labled, the image marked “Glider pulls towplane tail to the right” needs to be marked “Towplane please turn left”. The right hand image shows a request for a turn to the right. This image text was corrected in the errata 13a but a new image was not created. Review errata 13a for other changes that should be incorporated into this version of the handbook.

Key 51166-no
Current text: “… that crewmember picks up and holds the wing in a level position and signals the tow pilot to “take up slack” in the tow line. …”

Suggested text: “… that crewmember signals the tow pilot to “take up slack” in the tow line, ensures the pattern is clear of landing traffic. Once the slack is out, the wings are leveled and the crewmember once the rudder waggle signals are given signals the tow pilot to begin the takeoff. …”

Justification: The glider should be ready for launch once the wings are level. Taking up the slack first, then verifying that the pattern is clear, aids in demonstrating that both glider and tow pilots are ready to being the launch.

Key 32928-no
Current text: "The unassisted takeoff begins with the glider positioned slightly off the runway heading (runway centerline) by approximately 10–20° with one wing on the ground. If the glider is canted to the right, then the right wing should rest on the ground. If canted to the left, the left wing should rest on the ground. When ready for takeoff, the glider pilot advises the tow pilot either by radio or by signaling the tow pilot with the "ready for takeoff" rudder waggle signal. As the towplane accelerates, the wing on the ground (trailing wing) accelerates at a faster rate as the glider straightens, which allows that wing to lift off the ground more quickly. If the glider begins the takeoff roll aligned with the towplane during the takeoff, the wing on the ground tends to drag and severe swerving or a ground loop becomes more likely."

Suggested text: "The unassisted takeoff begins with the glider positioned slightly off the runway heading (runway centerline) by approximately 10–20° with one wing on the ground. If the glider is canted to the right, then the left wing should rest on the ground. If canted to the left, the right wing should rest on the ground. When ready for takeoff, the glider pilot advises the tow pilot either by radio or by signaling the tow pilot with the "ready for takeoff" rudder waggle signal. As the towplane accelerates, the wing on the ground accelerates at a slower rate due to the increased drag due to the ground contact. This imparts a yawing motion that will help straighten out the glider. The pilot should use rudder to raise the lower wing until sufficient speed is obtained to allow aileron control of the bank angle. If the glider begins the takeoff roll aligned with the towplane during the takeoff, the wing on the ground tends to drag and severe swerving or a ground loop becomes more likely.

Justification: The current text is incorrect. The lower wing will not initially accelerate faster as the drag caused by the ground friction will cause a larger yaw moving the nose away from the runway centerline. The acceleration noted would only occur once the wing tip is off the ground and the pilot is using rudder to yaw the gliders nose towards the centerline. This text now agrees with the last sentence, where the drag causes a yawing motion away from the wanted position.

Key 32938-no
Current text: "The glider should rest offset on the runway with the upwind wing on the ground and the glider angled approximately 20–30° into the wind. [Figure 7-5] As in a normal unassisted takeoff, the upwind wing swings forward at a faster rate than the downwind wing, aiding the pilot in leveling the wings. If the pilot begins the takeoff run with the downwind wing on the ground, a ground loop may result since the downwind wing will drag along the ground. The pilot should execute crosswind takeoff procedures as described above once the upwind wing rises and maintain a normal position directly behind the towplane."

Suggested text: "The glider should rest offset on the runway with the downwind wing on the ground and the glider angled approximately 20–30° into the wind. [Figure 7-5] As in a normal unassisted takeoff, the drag on the downwind wing imparts a yawing moment that swings the upwind wing forward at a faster rate than the downwind wing, aiding the pilot in leveling the wings. If the pilot begins the takeoff run with the downwind wing on the ground, a ground loop may result since the downwind wing will drag along the ground. The pilot should execute crosswind takeoff procedures as described above once the upwind wing rises and maintain a normal position directly behind the towplane."

Justification: Same reasoning as given for key Key 32928-no

Key 32948-no
Current text: "… For gliders with retractable gear, the pilot normally leaves the undercarriage down until reaching a safe altitude. When the tow utilizes a belly hook, the pilot normally leaves the undercarriage down during the tow since retraction could interfere with the tow line."

Suggested text: " … For gliders with retractable gear, the pilot normally leaves the undercarriage down until after release."

Justification: There is no advantage in raising the gear during tow. It can also cause a distraction which can cause the glider to get out of position endangering the tow pilot. Normal practice is to leave the gear down until after releasing from tow.

Image Key 3708
Current image: in book

Suggested action: redraw this image to correctly show the gliders position while conducting this maneuver.

Justification: The current image does not accurately show the gliders horizontal position in relation to the tow plane and the clouds. It appears that the glider on the high tow horizontal line is above the towplane, when it should be below it. It also appears that the glider on the low tow horizontal line is above the wake (shade blue rectangle). A better image would reference the horizon not some clouds to allow the reader to understand the positions the glider assumes during this maneuver.

Key 32963-no
Current text: "… A normal release occurs with the tow line under tension since hook-type towing attachments may need that force to make the hook swing open. Alternatively, a glider pilot may perform a "soft release," whereby the glider reduces the tension on the tow rope by climbing the glider slightly then descending just prior to release. When ready to release, … but the glider pilot should visually confirm the tow line release prior to beginning a climbing 90° right turn. [Figure 7-16A]"

Suggested text: "… A normal release occurs with the tow line under tension since hook-type towing attachments may need that force to make the hook swing open. When ready to release, … but the glider pilot should visually confirm the tow line release prior to beginning a 90° right turn. [Figure 7-16A]"

Justification: remove reference to 'soft release' it is not recommended and not a common practice at this time. Also remove reference to a climbing turn on release. That is no longer a recommended or practiced maneuver. It can lead to law of primacy issues on a low altitude rope break.

Key 33001-no
Current text: "… retracting the gear should wait until the aircraft becomes airborne and the pilot rules out an immediate or emergency return. …"

Suggested text: "… retracting the gear should wait until the glider achieved the desired tow altitude and releases the tow cable. …"

Justification: Current guidance and practice calls for leaving the gear down until off tow. For aerotows, the threat of distraction outweighs any benefit in climb rate that may be achieved. For a ground launch, the time involved is so short that it is a moot point.

Key 33004-no
Current text: "Prelaunch visual signals for a ground launch operation allow the glider pilot, the wing runner, the safety officer, and the launch crew to communicate over considerable distances. When launching with an automobile, the glider and launch automobile may be 1,000 feet or more apart. When launching with a winch, the glider may start the launch 4,000 feet or more from the winch. Because of the distances involved, members of the ground crew use colored flags or large paddles to enhance visibility, as shown in Figure 7-18. When

relaying information over large distances, direct voice communication between crewmember stations augments visual prelaunch signals, adds protection against premature launch, and facilitates an aborted launch if an unsafe condition arises."

Suggested text: "Prelaunch visual signals for a ground launch operation may allow the glider pilot, the wing runner, the safety officer, and the launch crew to communicate over considerable distances. When launching with an automobile, the glider and launch automobile may be 1,000 feet or more apart. When launching with a winch, the glider may start the launch 4,000 feet or more from the winch. When relaying information over large distances, direct voice communication between crewmember stations should be used. Visual prelaunch signals may augment this voice communications and may add protection against premature launch. Visual signals can be enhanced by the use of colored flags or large paddles, as shown in Figure 7-18. "

Justification: Given the potential large distance (4000 ft as noted) visual signals are no longer common. Instead modern radios are the primary source of communications between the glider pilot, wing runner, and tow car driver/winch operator. The text needs to describe current procedures and practices.

Key 33006-no
Current text: "Since ground launches occur quickly once the tow begins, inflight signals from the glider pilot to ground personnel only inform the winch operator or ground vehicle driver to increase or decrease speed. [Figure 7-19]"

Suggested text: "Since ground launches occur quickly once the tow begins, direct voice communications is the primary method between the pilot and ground operator to inform the winch operator or ground vehicle driver to increase or decrease speed. Inflight signals from the glider pilot to ground personnel may supplement this information. [Figure 7-19]"

Justification: modern radios are now the common method for communications. Visual signals are secondary.

Key 32919
Current Text: "Prior to takeoff, the tow pilot and glider pilot should agree on a plan for the aerotow …"

Recommended Text: "Prior to takeoff, the tow pilot and glider pilot are required by 14 CFR Part 91.309(a)(5) to agree on a plan for the aerotow …"

Justification: To emphasize the importance of a regulatory need for a pre-flight tow brief.

Image Key 3718
Recommended Image: Remove current image and add these two images.

Justification: Show both modern and vintage sailplanes self-launching
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Chapter 8 – Keys 7

Key 32926-no
Current text: “A hazardous situation may occur during takeoff if the glider pilot flies high above and loses sight of the towplane. If the tension on the tow line pulls the towplane tail up, the tow pilot may run out of up-elevator authority.”

Suggested text: “A hazardous situation may occur during takeoff if the glider pilot flies high above and loses sight of the towplane. If the tension on the tow line pulls the towplane tail up, the tow pilot may run out of up-elevator authority. In addition to a the towplane experiencing a nose down pitching moment, it is also loosing airspeed. The kiting glider creates a huge amount of drag which slows the towplane. It can take 1500 ft or more for the towplane to recover once the rope breaks or the glider pilot releases.”

Justification: This is a serious and often fatal condition that kills the towpilot, while the glider pilot returns to the runway. This paragraph needs to stress that danger.

Key 32927-no
Current text: “… If conditions permit a continued climb the towpilot can waggle the rudder to indicate something is wrong with the glider. …”

Suggested text: … If conditions permit a continued climb, the towpilot can make a radio call to inform the glider pilot of this condition, and once sufficient altitude has been achieved waggle the rudder to indicate something is wrong with the glider. …”

Justification: This signal should only be given if the towpilot can continue the climb and once the aircraft have reached a sufficient altitude to allow the glider pilot to deal with the situation. Glider pilots who misidentify this signal and release without sufficient altitude to land safely are placed in danger.

Key 51180-no
Current text: “If time allows, the tow pilot can use the radio and warn the glider pilot to close the spoilers. Without using radio, the tow pilot can use the “Rudder Waggle” signal for the glider pilot to check the glider. The glider pilot should not confuse this signal with the “Wing Rock” signal for the glider pilot to release the tow rope. This mistake would leave the glider pilot at low altitude with the spoilers open and make a safe landing very difficult.”

Suggested text: delete this paragraph, it simply repeats what was written in 32927-no

Justification: repeating the same message with slightly different text does not make sense.

Key 34269-no
Current text: “A glider pilot may consider and attempt a downwind landing on the departure runway if the glider possesses sufficient altitude to make a course reversal. [Figure 8-6, panel 3]”

Suggested text: “A glider pilot may consider and attempt a downwind landing on the departure runway if the glider possesses sufficient altitude, is a sufficient distance from the departure end of the runway, and has enough lateral distance to successfully make a course reversal that puts the glider on the extended runway centerline. [Figure 8-6, panel 3]”

Justification: Too many accidents occur because glider pilots only consider altitude when deciding to turn back to the runway. The text needs to make it clear that altitude alone is not sufficient. Being far enough from the runway and offset enough to complete the turn an obtain the runway alignment are also essential elements.

Key 34273-no
Current text: “During a course reversal, the pilot should make the initial turn into any crosswind using a 45° bank angle. This bank angle provides a safe margin above stall speed, incurs an acceptable amount of altitude loss, and completes a course reversal in a timely manner. …”

Suggested text: “After establishing a pitch attitude that will keep the glider flying the pilot should evaluate the situation and determine which action to take. If a course reversal is appropriate, the pilot should make the initial turn away from any crosswind using a 30° bank angle. This will be followed several seconds later by a 30° turn into the crosswind. This bank angle provides a safe margin above stall speed, incurs an acceptable amount of altitude loss, and completes a course reversal in a timely manner. The initial turn away from the crosswind ensure that the glider has turning room needed to allow the glider to roll out on the extended runway centerline. “

Justification: Immediately turning, as this paragraph implies, leads to accidents and turning stalls/spins. Instead the proper action is to stabilize the glider, confirm that the action you are about to take is correct, and then put the glider in a position to safely complete the maneuver.

Key 34292-no
Current text: "… The pilot should use appropriate signals to direct the launch operator to increase or decrease speed. …"

Suggested text: "… The pilot should use appropriate radio calls and augment with visual signals if necessary, to direct the launch operator to increase or decrease speed. …"

Justification: radio communications should be used in addition to or in place of visual signals.

Key 34394-no
Current text: "… A positive control check prior to flight verifies control system continuity."

Suggested text: "… A critical assembly check aids in confirming the glider has been assembled correctly and a positive control check prior to flight verifies control system continuity."

Justification: The PCC is just one additional check, the CAC is another that needs to be referenced.

Chapter 9 – Keys 1, image keys 2

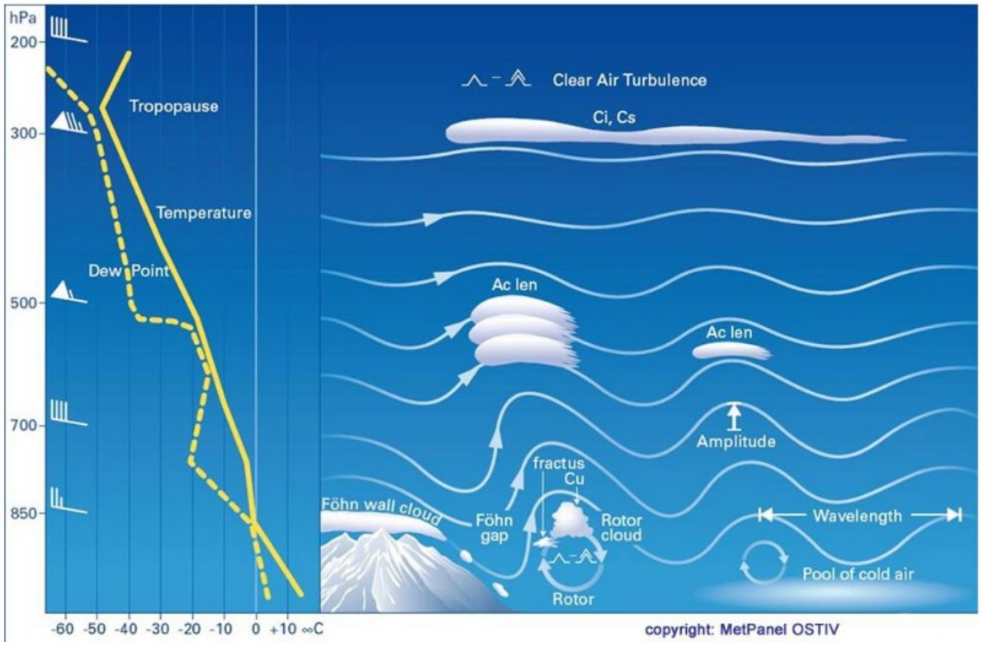
Image Key 3853
Current image:

Recommended image: the image needs to be redrawn to confirm with reality. The area marked best lift needs to move upslope so it extends from the top of the ridge to about 1/3rd of the way down the ridge face. The white dashed line marked 'Lift zone' needs to be redrawn to show it staying on the upwind side of the ridge peak and intercepting the ridge face about half way down the face.

Justification: Ridge lift means that the glider is operating close to terrain and if the wind changes speed or direction that lift can quickly stop. In that case the pilot will be faced with an immediate landout. The image puts the pilot way too low to the valley floor and outside the optimal lift zone.

Image key 3859
Current image

Suggested image:



Justification: The current image does not correctly depict the standing wave systems used in flight. The image shows the peaks going straight up over a fixed spot on the terrain. This is incorrect, the peaks move slightly upwind with altitude. The suggested image correctly shows a wave system, as described in paragraph key 33847-no. The FAA has permission to use this image and should note that permission is given by OSTIV Meteorology panel (the international technical and scientific soaring organization).

Key 33773-no
Current text: "... Thermals do not necessarily develop on a warm sunny day. …"

Recommended text: "... Thermals might develop on a warm sunny day. …"

Justification: Thermal production is a function of local heating causing a small parcel of air to become warmer than the surrounding air, thus causing it to rise and cool at the dry adiabatic rate. The temperature differential is required not absolute premature.

Chapter 10 – Keys 3, image keys 1

Key 51166-no
Current text: "… Gliders can experience winglet stalls in uncoordinated flight, and pilots of gliders with winglets should maintain coordinated flight in steep turns. Glider pilots should consult their flight instructors regarding the proper technique for steep turns during thermalling."

Suggested text: "… Glider pilots should consult their flight instructors regarding the proper technique for steep turns during thermalling."

Justification: Winglets are not simple vertical stabilizers. They function in the wings flow field and according to aeronautical engineers who design winglets, you cannot stall a winglet by putting the glider into an uncoordinated flight condition. Removing the sentence regarding winglet stalls is required.

Key 34533-no
Current text: "Flying at minimum sink speed for the G-load on the glider optimizes the climb in a well-formed thermal and light turbulence. Flying in thermals either above or below this speed will degrade glider performance. As discussed in Chapter 3, decreasing the airspeed in a turn will decrease the radius of the turn. The examples in this paragraph assume a minimum sink speed of 60 mph. At a 30° bank angle, decreasing speed from 60 to 40 mph decreases the radius of the circle by almost 250 feet. While this reduced radius may place the glider closer to strong lift near the thermal center, glider performance will suffer from the increased rate of descent while flying at an airspeed below the minimum sink speed. An increased bank angle to achieve a smaller diameter circle may provide better optimization. For example, while maintaining a minimum sink speed of 60 mph, increasing the bank angle from 30 to 45 degrees will decrease the turn radius by over 175 feet. Increasing the bank angle from 30 to 60 degrees will decrease the turn radius by over 275 feet. While some gliders can safely fly several knots below minimum sink speed to reduce the turn radius, the increased sink rate at lower speeds may offset any gain achieved."

Suggested text: "Flying at minimum sink speed for the G-load on the glider optimizes the climb in a well-formed thermal and light turbulence. Flying in thermals either above or below this speed will degrade glider performance. The minimum sink speed is a function of the 1G minimum speed multiplied by the load factor. While a steeper bank angle achieves a smaller turn radius, it also means a higher minimum sink speed is required. Finding the optimal bank angle, at the appropriate minimum sink speed, will maximize the climb rate for that thermal. "

Justification: The numbers listed need to be realistic. If the min sink speed for this glider is 60 mph at 30deg of bank, then it would have a 1.2G stall speed of about 48 mph. Thus it could not slow to 40 mph. Also increasing the bank angle without adjusting the min sink speed for this bank angle fails to make the point clear. That is, the min sink speed changes with the bank angle and the pilot needs to modify both to maintain controlled flight.

Key 34544-ol
Current text: "… turn for a few seconds 60°after encountering the weakest lift …"

Suggested text: "… turn for a few seconds 60° after encountering the weakest lift …"

Justification: Typo, fix missing space between the deg sign and the word 'after'.

Image Key 3782
Current image: arrow head showing direction of circling gliders

Suggested image: reverse arrow head

Justification: gliders are making counterclockwise circles (left turn) but the arrow indicates that they are turning in a clockwise direction.

Chapter 11 – Keys 10, image keys 1

Key 34654
Current Text: The pilot should determine if the glider, equipment, and the pilot can maintain safely given the known and expected environmental conditions along the route of flight.

Recommended Text: The pilot should determine if the glider, equipment, and the pilot can maintain an acceptable margin of safety given the known and expected environmental conditions along the route of flight.

Justification: Proper pre-flight preparation can significantly affected whether a cross country flight can be completed safely.

Key: 34666-li
Current issue: Missing reference to the Critical Assembly Check in the ul list.

Suggest action: add new ul key to the document following 34669-ul (Positive Control Check). New text is "Critical Assembly Check".

Justification: The soaring community instituted a "critical assembly check" to the post assembly process to ensure that all critical items that must happen during the assembly have been completed. This includes items like ensuring that the main spar pin(s) are secured using the manufactures installed safety pins or procedures. Or ensuring that all manual control connections are on and have the appropriate safety pins/mechanisms installed/used. Skipping this step has been a known cause of serious accidents.

Key 34678
Current Text: High-performance gliders often have glide/navigation computers that automatically compute the glide ratio (L/D).

Recommended Text: Most modern soaring navigation computers and apps have the capability to compute and display altitude and the glide ratio (L/D) required to reach the next waypoint.

Justification: The ability to effectively use modern soaring navigation computers is essential to safely flying cross-country.

Key 34716
Current Text: The exact altitude where the thought processes should shift from soaring to landing preparation depends on the terrain. In areas where numerous fields suitable for landing may exist, the pilot can delay field selection to a lower altitude.

Recommended Text: The exact altitude where the thought processes should shift from soaring to landing preparation depends upon many factors. Pilot should establish a personal Hard Deck below which they will focus exclusively on a safe off-field approach and landing. These factors include pilot proficiency and experience, the terrain, aircraft performance, and local weather conditions. The Hard Deck altitude must be sufficient to allow for the recognition and recovery from an inadvertent Loss of Control In-flight with enough altitude to accomplish a safe approach and landing. In areas where numerous fields suitable for landing may exist, the pilot can delay field selection to a lower altitude but never below the Hard Deck.

Justification: LOC-I is the leading cause of GA accidents. Awareness of situation that may lead to increased chance of LOC-I must be avoided.

Key: 34686-no
Current text: "… Most electronic speed-to- fly directors include audio indications, …"

Suggested text: "… Most electronic speed-to-fly directors include audio indications, …"

Justification: This is a nit, there is an extra space preceeding the word 'fly' which should be removed.

Key: 34607-no
Current issue: Paragraph has duplicate text. The first 3 sentences are repeated verbatim in the 2nd half of the paragraph.

Suggested action: Remove the duplicate sentences

Justification: Duplicate text needs to be removed.

Keys: 34722-no and 34724-fi, image key 3829
Current issue: the figure 11-11 (image key 3829) does not match the text listed in paragraph 34722-no.

Suggest action: update image to show the lift band that matches the text, and include a pointer from the text to the image.

Justification: The text in 34722-no clearly describes what a lift band is and how a pilot can/should use this band during a cross-country flight. That is, stop thermaling when the glider climbs above the lift band. However, the image does not match the text and implies that the top of the lift band always coincides with the cloud base. Clarifying the image to align with the text would make it clear that always climbing to 500 ft below cloud base is not the best action when making a cross-country flight.

Key 34741-no
Current text: "… therefore decreases the overall amount of descent but produces the best forward progress. …"

Suggested text: "… therefore decreases the overall amount of descent while producing the best forward progress. …"

Justification: The current text does not accurately describe what is happening. It implies that using 'dolphin flight' techniques indirectly achieves the best forward progress. The text needs to make it clear that this technique directly achieves the best forward progress. Meaning the actions taken by the pilot drive the results, not that the results may or may not happen.

Key 34759-no

Current text: "… Sustainer engines typically eliminate the need for a time-consuming retrieval at the end of a cross
country, and they operate with less complexity than their self-launching counterparts. …"

Suggested text: "… Sustainer engines may eliminate the need for a time-consuming retrieval at the end of a cross-country, but their complexity can introduce addition factors that the pilot needs to consider before gliding out of range of a safe landing area. …"

Justification: Just because the glider has a sustainer engine does not mean it is less complex that a self-launching glider. Not all sustainer engines have an electric starter. Some internal combustion engine powered gliders have a compression start system where the pilot must deploy the engine/propeller, dive the glider to get the propeller windmilling, then close a compression valve to allow the engine to start. In addition, sustainer systems may not provide a strong climb rate under power or may have limited run time capabilities (limited fuel). Thus it is not correct to say there are less complex than a self-launch glider.

Chapter 12 – Keys 3

Key 34789-no
Current text: "Tow plane equipment in the United States typically uses two types of tow hooks: Tost or Schweizer. [Figure 12-2] The tow pilot should inspect the tow hook for proper operation daily and prior to any tow activity."

Suggested new text: "Tow plane equipment in the United States typically uses one of two types of tow hooks: Tost or Schweizer. [Figure 12-2] The tow pilot should inspect the tow hook for proper operation daily and prior to any tow activity."

Justification: The current text implies that a tow plane is equipped with both of these tow hooks. This is not correct and it should be clear that only 1 tow hook is installed on any individual tow plane.

Key: 52161-no
Current issue: this paragraph is printed twice.

Suggested action: remove duplicate paragraph

Justification: the duplicate paragraph should not be in the final document.

Key: 34854-no
Current text: " … If the tow pilot allows the departure path to drift with a crosswind, it reduces the radius of a turn back to the runway in the event of a low altitude emergency."

Suggested text: "… … If the tow pilot allows the departure path to drift downwind with a crosswind, assuming no obstructions, it offsets a glider with sufficient altitude and horizontal position, allowing the glider pilot to execute a turn back to the runway eliminating the need for additional low altitude maneuvering."

Justification: The radius of a turn is fixed and based on a specific airspeed and bank angle. Moving the location where one starts a turn does not reduce the radius of the turn. This type of offset simply means that at the completion of the turn the glider will roll out on the extended runway centerline. The text also needs to make it clear that the glider needs to have enough altitude to safely make this turn and be positioned far enough away from the runway departure point to allow the glider pilot to execute a safe landing after completing the turn.

Chapter 13 – Keys 2

Key: 34941-no
Current text: "… Risk Management Handbook (FAA-H-8083-2A) …"

Recommended new text: "… Risk Management Handbook (FAA-H-8083-2) …"

Justification: In most of the other cases, the document references a FAA handbook using just it's base number, not the current revision (A, B, C, etc). This reference format should be consistent throughout this document.

Key: 34946-no
Current text: "Hazardous attitudes include complacency, indiscipline, and overconfidence, which all increase the risk of a glider accident."

Recommended new text: "Hazardous attitudes lead to hazardous behaviors that include complacency, indicipline, and overconfidence, which all increase the risk of a glider accident."

Justification: The Risk Management Handbook and the chapter 2 of the Pilots Handbook of Aeronautical Knowledge both reference the 5 hazardous attitudes. This document introduces 3 new behaviors that it calls hazardous attitudes. This document needs to continue to use the common aviation terms (5 hazardous attitudes and antidotes) and not invent new terms. Changing them to hazardous behaviors seems to be the best option to preserve these ideas, while conforming to the standard aviation terms.
