FLIGHT

FLIGHT OPERATIONS MANUAL

TRAINING

CIRRUS AIRCRAFT

CIRRUS PERSPECTIVE AVIONICS - INSTRUCTOR EDITION

Flight Operations Manual

Instructor Edition
Cirrus Perspective Avionics
SR20, SR22, SR22T

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NOTE

Procedures in this publication are derived from procedures in the following FAA Approved Airplane Flight Manuals (AFM):

- SR20, P/N 11934-004, Reissue A,
- SR22, P/N 13772-004, Original Release,
- SR22T, P/N 13772-005, Original Release.

Cirrus Aircraft has attempted to ensure that the data contained agrees with the data in the respective AFM. If there is any disagreement, ***the Airplane Flight Manual is the final authority***.

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Introduction

Instructor Welcome

Welcome to the Cirrus Training Partner network. Whether you are a Cirrus Training Center Chief Pilot, Cirrus Training Center Instructor, or Cirrus Standardized Instructor Pilot, your contribution to improve general aviation safety can be significant. The importance of using standardized flight and teaching methods while holding pilots to high standards cannot be overstated. It is the responsibility of every Cirrus Training Partner to integrate the best teaching practices and flight procedures referenced in the Flight Operations Manual (FOM), Instructor Edition and the Airplane Flight Manual.

The Cirrus Training Partner network is composed of experienced professionals and flight training organizations whose instructors have successfully completed the Cirrus Standardized Instructor Pilot (CSIP) course. Membership in this exclusive group requires dedication to continuing education, professional conduct, and a desire to provide maximum customer value through excellence in flight education. A Cirrus Training Partner must go beyond the role of a traditional flight instructor to become a mentor to pilots and positively affect behaviors of those trained.

Cirrus Training Partners Code of Conduct

- Lead through example by consistently operating and teaching standard procedures,
- Never compromise safety of flight,
- Provide maximum value to the customer in all flight instruction through extensive preparation and planning, adapting teaching techniques to customer learning styles, and maintaining expert levels of knowledge and skill,
- Provide excellent customer service by customizing training events to specific customer needs,
- Listen and respond thoughtfully. Provide the customer with feedback in a manner that can be assimilated easily,

- Never complete a course or sign off a customer until proficiency for all course objectives has been demonstrated to the level described in the completion standards,
- Be a mentor to your customers by developing and maintaining a professional relationship.

Document Use

The FOM, Instructor Edition is a resource available to all Cirrus Training Partners for planning instructional activities in Cirrus aircraft. This document is based upon the FOM, Pilot Edition, but is expanded to include useful information for flight instructors. Guidance for scenario setups and execution along with techniques for overcoming common student errors are described within. Instructors are strongly encouraged to become familiar with the contents of this document and reference this document frequently when conducting training in Cirrus aircraft. In addition to maneuver setup and execution guidance, the following sections are included and should be used as described below:

Completion Standards

The Completion Standards section describes the completion standards required to complete a maneuver or procedure while conducting training. Use this section when assessing whether the pilot has acquired the necessary knowledge or skill for a particular task or knowledge area. The completion standards described in this document are expanded beyond what is described in the Cirrus Syllabus Suite.

The procedures and maneuvers described in this document are based upon the Private Pilot, Commercial Pilot, and Instrument Rating Practical Test Standards, but include additional information that is specific to Cirrus aircraft.

Instructor Notes

The Instructor Notes section contains valuable teaching techniques and emphasis areas to be included when conducting all training in Cirrus aircraft. Valuable and specific guidance on scenario setup and execution is provided. Maneuver and procedure limitations are provided to ensure acceptable safety margins are maintained when practicing higher risk training maneuvers and procedures. It is the instructor’s responsibility to ensure the safety of flight is **never** in jeopardy.

Common Errors

The Common Errors section provides a description of typical errors made by pilots learning to fly in Cirrus aircraft. Use this information to anticipate pilot actions, lack of actions, or mistakes commonly made during training. The Instructor Notes section compliments this information by providing useful instructor techniques for preventing or correcting common pilot errors.

Maneuver Limitations

Practicing emergency procedures or repetitive maneuvering during flight training can be conducted safely when the flight instructor exercises good judgement and carefully plans and executes instructional events. Follow the guidance found in the Maneuver Limitations section when performing various maneuvers and procedures described within during flight training.

Training Resources

Each instructional activity requires a specific and well thought-out plan of action to maximize customer value. Use the guidance provided in this section when developing plans of action considering the Cirrus pilot's specific needs, available Cirrus training resources, and desired results of the training event.

Cirrus Training Portal

The advanced avionics, airframe, systems, and powerplant in Cirrus aircraft can vary from model to model. Cirrus offers a host of information to ensure the necessary resources are available for conducting flight training in all aircraft configurations. It is the instructor's responsibility to use the appropriate and most recent material while conducting flight instruction.

Every current Cirrus Training Partner receives access to the Cirrus Training Portal. On the Cirrus Training Portal, instructors can access pre-training workbooks, training presentations, aircraft publications, avionics publications, instructional resources, and reference material for Cirrus aircraft, including the Cirrus Icing Awareness Course. An access code will be provided before completion of the standardization training. Visit http://.training.cirrusaircraft.com to access your account. Unlimited access is available until partner membership status is terminated or expired.

Cirrus Pilot Training Kits

By creating an account with Cirrus Connection, Cirrus Training Partners receive a substantial discount on merchandise and training materials, including training kits. Go to www.cirrusconnection.com to create an account and order training materials.

Cirrus pilot training kits are specific to avionics and airframe. Ensure the proper kit is ordered for each Cirrus pilot conducting training.

The following resources are available in training kits or stand alone through Cirrus Connection. See the description below each item to identify the applicability to Cirrus pilot training.

Cirrus Aircraft Training Software (CATS) II - for Avidyne

CATS II is available in DVD format for PC. CATS II is an animated POH for both the SR20 and SR22 with Avidyne avionics. The interactive training software graphically depicts the aircraft cockpit and aircraft systems. It also contains an interactive checklist trainer and quizzes to test systems and component knowledge.

Cirrus Aircraft Training Software III - for Perspective

CATS III is available via the web at www.cirrusperspective.com. Similar to CATS II, CATS III contains systems animations, quizzes, and cockpit features for aircraft equipped with the Cirrus Perspective avionics system.

Cirrus Perspective Online Training Course

The Cirrus Perspective Online Training Course is available at www.cirrusperspective.com. This interactive course guides users through the basic features and functions of the Cirrus Perspective avionics system including PFD setup and controls, MFD page navigation and control, basic flight planning, and communication control.

Cirrus Perspective Simulator

The interactive, free play simulation of the Cirrus Perspective avionics system is a great learning and teaching resource that allows users to practice avionics-related procedures on a PC as they would in the aircraft.

Aerosim Avionics System Trainer

The Aerosim Avionics System Trainer is available for download in DVD format. In addition to interactive courseware that guides users through the proper use of the Avidyne PFD and MFD, Garmin GNS 430s, audio panel, and S-Tec autopilot. The course also includes a simulation of the entire Avidyne avionics suite in a free play mode allowing users to learn the intricacies of the avionics system. The freeplay mode allows repositioning to airports included in the database along with basic flight controls through the autopilot.

Jeppesen Online Transition Training

The Jeppesen Online Transition Training course is deployed online and is specific to Cirrus aircraft equipped with Avidyne avionics. The guided courseware instructs users in the basic knowledge areas necessary for flight training and is a great pre-training resource. The Jeppesen course includes a quizzing and tracking tool allowing the instructor to monitor the Cirrus pilot’s progress and completion status. A flight syllabus and supporting material is provided in PDF format available for download. Contact Jeppesen at 1-800-732-2800 for more information.

Cirrus Icing Awareness Course

The Cirrus Icing Awareness Course is hosted through the Cirrus Training Portal. An access code can be purchased at Cirrus Connection. This online course will prepare you for the challenges of flying into known icing conditions (FIKI). The course provides an overview of the TKS anti-ice system, proper operating procedures, and three scenarios that follow flights into various types of icing conditions.

This training course will satisfy the following POH Limitation for the Known Icing System:

> "The pilot-in-command must successfully complete the Cirrus Icing Awareness Course or a Cirrus Design approved equivalent training course, within the preceding 24 months prior to Flight Into Forecast or Known Icing Conditions."

Cirrus Syllabus Suite

Five Cirrus pilot training syllabi are provided to all Cirrus Training Partners. It is the responsibility of each instructor to select the appropriate syllabus considering each Cirrus pilot's unique background. See the following section in this document for guidance on selecting the appropriate syllabus for individual Cirrus pilots.

Flight Operations Manuals, Pilot Edition

The pilot edition of the Perspective and Avidyne Flight Operations Manual are similar to this document but have information limited to specific aircraft operation, maneuvers, and procedures for Cirrus pilots. All Cirrus pilots should be encouraged to become familiar with and abide by the procedures and recommendations provided.

Cirrus Syllabus Suite

Cirrus provides five transition training syllabi and one recurrent training syllabus to guide Cirrus pilots and instructors while transitioning into Cirrus aircraft. Individual syllabi are designed for specific Cirrus pilot types, considering past and recent flight experience. A description of each syllabus and its appropriate use is included below. Reference the actual syllabus for more guidance on how to use each syllabus.

• Note •

> Cirrus transition, differences, and recurrent syllabi should only be used with current and active pilots. Pilots lacking recent flight experience may need additional training beyond the

scope of the transition syllabus. The instructor should add the additional objectives as necessary.

The Transition Training syllabi are not specific to airframe, powerplant, or avionics, but are written in a fashion that allows them to provide ample guidance for all training objectives regardless of aircraft type.

Transition Training Syllabus

The Transition Training Syllabus is intended for Cirrus pilots who have little to no Cirrus experience or formal Cirrus training. It focuses on basic aircraft control, use of avionics, use of autopilot, and key emergency/abnormal situations in VFR conditions. Training effectiveness is enhanced through the appropriate use of scenario based training techniques. On average the course takes approximately three days and ten flight hours to complete. Completing the objectives of the Transition Training Syllabus typically satisfies most insurance requirements or aircraft checkout procedures for pilots new to Cirrus aircraft. Instrument tasks may be added to the syllabus as desired by the instructor considering the Cirrus pilot's performance and aptitude. Adding additional tasks or maneuvers will lengthen the completion time of the course.

It is highly recommended that instrument rated pilots who complete the basic Transition Training Syllabus obtain 15 to 30 hours of PIC time, and then complete more advanced instrument training to an IPC level as defined in the FAA Instrument PTS.

Advanced Transition Training Syllabus

The Advanced Transition Training Syllabus is designed for instrument rated pilots transitioning into Cirrus aircraft with little to no Cirrus experience or formal Cirrus training. The Advanced Transition Training Syllabus can be substituted for the Transition Training Syllabus for pilots who wish to gain instrument competency and complete an IPC as a part of their initial training in Cirrus aircraft. The Advanced Syllabus adds approximately two days and six hours beyond the basic Transition Training Syllabus. Pilots desiring to complete this course must be proficient and current instrument rated pilots. Pilots with minimal IFR experience or those who lack recent IFR experience should complete the Transition Training Syllabus, gain Cirrus PIC experience, then complete instrument training and an IPC.

Avionics Differences Training Syllabus

The Avionics Differences Training Syllabus is a condensed training course specifically designed for proficient Cirrus pilots who are learning to fly a Cirrus aircraft with a new avionics platform. This syllabus applies to Cirrus pilots upgrading from traditional to electronic instruments, Avidyne to Perspective or Perspective to Avidyne. Pilots must have extensive and recent Cirrus experience and/or previously completed Cirrus Transition Training. This one-day course focuses on the different skills required to operate the avionics system in a VFR environment. Instrument tasks may be added at the discretion of the instructor considering the Cirrus pilot's performance and aptitude.

Airframe and Powerplant Differences Training Syllabus

The Airframe and Powerplant Differences Training Syllabus is a one-day condensed training course designed for pilots with prior Cirrus aircraft experience and/or formal training. It is to be used for pilots transitioning from an SR20 to an SR22, an SR22 to an SR20, a normally-aspirated to a turbo engine, or a turbo to a normally-aspirated engine. Instrument tasks may be added to the Difference Syllabus as desired by the instructor considering the Cirrus pilot's performance and aptitude.

• Note •

> Cirrus pilots should complete the Transition Training Syllabus when transitioning into a Cirrus aircraft with a new powerplant and/or airframe with a different avionics suite.

Recurrent Training Syllabus

Regular scheduled recurrent training is an important step in maximizing the safe-utility of the aircraft. It provides pilots with an opportunity to perform procedures and maneuvers that help develop and refresh airmanship and judgement skills. Recurrent training also provides a good opportunity to regain instrument, landing, and flight review currencies. Emphasis is placed on basic stick and rudder skills, aircraft control, systems failures, and instrument currency if applicable.

Additional Syllabus - "Access to Flight"

"Access to Flight" is a combined Private Pilot and Instrument Rating training syllabus and associated textbook designed entirely around the Cirrus SR20 and SR22. Teaching methods are strongly focused on Scenario Based Training (SBT) and developing Single-Pilot Resource Management skills in order to take full advantage of all the resources available to the Cirrus pilot. “Access to Flight” is available in student and instructor versions. New pilots looking for the most efficient and advanced method to obtain a Private Pilot certificate with an Instrument Rating should use the “Access to Flight” syllabus and text. A Private Pilot and Instrument kit is available through Cirrus Connection and contains the necessary materials and resources to prepare the Cirrus pilot for the Private Pilot and Instrument Rating practical tests.

Conducting Training Events

Conducting ground and flight training events requires preparation time on behalf of both the instructor and Cirrus pilot. All Cirrus courses are composed of three phases: pre-training or self-study, instructor-led, and recurrent training. It is the instructor's responsibility to lead the Cirrus pilot through all phases of training using the guidance provided in this section.

Cirrus courses also integrate FAA Industry Training Standards (FITS) training methodology, including: scenario based training, single pilot resource management, and learner centered grading. Instructors new to these concepts should set aside more preparation time in order to conduct a seamless and effective training event.

Aircraft Variations

It is important to note that the instructor standardization course focuses on the specific model used during actual flight training. It is the responsibility of each instructor, as a professional and as a Cirrus partner, to become familiar with each variation of Cirrus aircraft prior to conducting flight instruction in that variation.

The differences between the Avidyne Entegra avionics suite and Cirrus Perspective suite are substantial. Cirrus advertises instructors at www.cirrusaircraft.com as being either Avidyne, Perspective, or dual qualified. Instructors must receive flight training in both avionics systems or self learn via an avionics differences course, purchased through Cirrus Connection, to obtain the respective qualifications. Visit www.cirrusconnection.com to purchase a Perspective or Avidyne Instructor Training Kit.

Pre-Training

Cirrus Training Partner governing documents require that all pilots completing a Cirrus course receive a training kit and complete the necessary pre-training objectives detailed in the pre-training checklist.

Training kits should be ordered 15 to 30 days before conducting flight training in order to provide the Cirrus pilot ample time to complete all necessary pre-flight training activities. Additional time will be required for ground briefings and avionics training if the Cirrus pilot fails to complete all pre-training objectives.

Pre-training is composed of two primary objectives. Guidance for accomplishing these objectives is included in customer training kits.

- First, develop knowledge of aircraft limitations, aircraft systems, and normal and emergency operating procedures,
- Second, develop knowledge of avionics components, component integration, and limitations and develop basic skills required to navigate MFD pages and conduct basic VFR flight planning and communication tasks.

Before beginning flight training, it is important for the instructor to assess the level of knowledge and basic avionics skills retained by the Cirrus pilot. Accomplish this by reviewing completed training materials and oral quizzing and discussion.

The most efficient method of developing avionics-related skills is through practice and repetition in a non-flight environment. The actual avionics in the aircraft with a power cart, avionics procedure trainer, or simulator are all effective tools for developing muscle memory and other skills required for avionics operation. The Cirrus pilot must be able to accomplish basic VFR communication and navigation avionics tasks prior to the first flight. New or advanced avionics tasks should be introduced on the ground with the avionics in the aircraft or avionics procedure trainer throughout the course as appropriate.

Ground instruction for Cirrus courses may take up to a half or full day depending on the scope of training and student preparation.

Integrating Simulation into Training

When properly used, simulators and flight training devices can greatly enhance training effectiveness, safety, and efficiency. Cirrus Aircraft encourages the use of simulation during Cirrus courses. Fidelity of simulators and flight training devices vary in avionics, performance characteristics, and handling characteristics in relation to the actual aircraft. CAPS training is greatly enhanced by the use of simulators or flight training devices. Provide sufficient time and repetition to develop the necessary skills to deploy the parachute properly. Then, place the Cirrus pilot in situations that require decisions to deploy, such as: engine failure situations, icing, and/or situations that lead to loss of control.

A level one or higher flight training device (FTD) can be used to complete lessons and tasks within Cirrus courses, provided the device matches the avionics configuration and model of the aircraft in which the flight training is being conducted with a level of fidelity that transfers knowledge and skills into the actual aircraft. Credit for takeoff and landing practice may only be given when performed in the actual aircraft.

Integrating FITS Methodology into Training

The mission profiles typically flown by Cirrus pilots require sound aeronautical decision making skills, single pilot resource management skills, and aircraft and avionics management skills. Development of these critical skills is greatly enhanced by properly integrating FITS concepts into day-to-day instruction. Additional guidance on integrating FITS concepts into Cirrus courses is provided in the Cirrus Syllabus Suite.

When applicable, the following techniques should be integrated into flight and ground training strategies in Cirrus courses:

- Correlate all maneuvers, procedures, and knowledge topics to real-life situations,
- Ensure Cirrus pilots understand the relevance of each task completed during the course,
- Encourage Cirrus pilots to make pilot in command decisions throughout the pre-flight, flight, and post-flight,
- Allow Cirrus pilots to see the consequences of poor decisions when possible, but never compromise the safety of flight,
- Complete each leg of a multiple leg training mission as an individual flight, as most non-training flights are conducted,
- Facilitate learning situations that require higher-order decision-making skills,
- Use creative questioning that causes the Cirrus pilot to come to conclusions by him or herself, instead of simply providing answers to problems,
- Engage the Cirrus pilot during post-flight discussions causing him or her to reflect back on decisions made during the flight,
- Make the Cirrus pilot responsible for necessary flight planning and any weather go/no-go decision making during Cirrus courses,
- Help the Cirrus pilot become aware of his or her strengths and weaknesses through engaging post-flight discussion, instead of a one-sided, instructor-led critique.

More information on the FITS is available online at www.faasafety.gov.

Assessing Performance

Assessing pilot or student performance is one of the most important responsibilities of a flight instructor. Transition training is developmental by nature and the prior experiences of the Cirrus pilot in training must be considered. A formal evaluation flight may not exist in the course being used. In fact, transitional-type training events rarely require an FAA check ride or flight instructor endorsement. Flight instructors must balance levels of teaching and assessment continuously. Use the following evaluation techniques when assessing performance in relation to course completion standards.

- Be knowledgeable of all course and task completion objectives and standards. Cirrus completion standards consist of knowledge and skill objectives that can be easily observed by the flight instructor,
- Stay as hands-off as possible and closely observe actions, lack of actions, division of attention, task saturation, aircraft control issues, frustration, or programming errors. Instructor intervention almost always demonstrates inadequate performance on the behalf of the Cirrus pilot. Remedial training and/or additional attempts may be required for a specific task,
- Always measure performance in relation to course completion standards,
- Ensure performance is adequate and consistent. Do not assume that demonstration of a task one time represents that the Cirrus pilot has acquired the necessary knowledge or skill,
- Adapt teaching styles appropriately as the Cirrus pilot progresses through the course. Teaching should be more instructional in nature at the beginning. Once basic skills are developed, the instructor should focus on facilitating experiences that further develop skills and provide learning experiences.

Techniques for Resolving Training Issues

While it is uncommon, active flight instructors will eventually deal with a customer whose flight proficiency and/or risk management skills are extremely deficient and raise significant concern. Pilots with inadequate skills, judgement issues, and hazardous attitudes are at a higher risk for accidents. It is the instructor’s responsibility, as a professional, to identify these issues and make every attempt to change the risky behaviors. Correcting these poor examples of behavior can have a significant impact on improving general aviation safety records.

Dealing with risky behaviors can be uncomfortable for the instructor, especially for instructors with less experience. It is oftentimes not easy for pilots to receive such messages or discuss poor performance or dangerous activities. Nonetheless, flight instructor intervention may be the only thing that prevents the pilot from having an accident. If the instructor is uncomfortable with such an intervention, he or she should seek advice and/or assistance from a more experienced instructor or respected pilot.

This section provides guidance for identifying and correcting these rare training cases. In all situations, it is important for the flight instructor to be aware and evaluate the quality of instruction that is provided to the customer. The root causes of these issues may be due to poor instructor techniques, not pilot aptitude or attitude.

Skill-Based Issues

Skill-based issues are usually easier to identify than risk-management issues. They are also typically easier to overcome through additional training and evaluation using the techniques described herein.

Taking excessive time on a task to develop a skill is an indication of an aptitude issue. A red flag should be raised any time a pilot spends twice as much or more time on task than is typically required by average pilots to develop a particular skill.

It is often incorrectly assumed that rated pilots attempting Cirrus courses are safe, competent, and capable of performing to the standards detailed in the Private Pilot PTS. Unfortunately, this is not always the case and additional time may be required to hone or redevelop fundamental skills. The additional training required to redevelop fundamental skills will add time to Cirrus courses, and should be communicated early in the training when additional time will be required for course completion to prevent additional frustrations on the part of the Cirrus pilot.

Inform the pilot of training issues soon after they recognized and before more training is conducted. Develop a strategy for correcting the behavior and communicate the plan with the pilot. Some strategies may include more time on task on fundamental maneuvers, but they may be as extreme as handing the pilot off to a more experienced or different instructor.

Here are some suggestions when dealing with skill-related issues:

- Have the Cirrus pilot master fundamental skills before attempting more advanced maneuvers or procedures. For example, landing issues are generally due to aircraft control issues. Master slow flight in various configurations while changing headings, altitudes, and airspeeds before continuing on with landing practice,
- Develop clear and concise personal weather minimums with the pilot, similar to what is done with student pilot solo flights, when performance is marginally within standards. For example, a pilot may be able to land the aircraft safely with little or no wind but struggles and does not demonstrate mastery while landing with a crosswind. Get the pilot to agree to not fly in wind conditions that exceed XX value. Then, develop a training plan for expanding weather minimums and capabilities,
- Hand the pilot off to another trusted or more experienced instructor. Sometimes a new perspective is all it takes for skill sets to ‘click’. This also provides an opportunity for a second opinion and help with developing a training strategy,
- Do not complete the intended course until the pilot’s performance is within standards and the pilot is clearly aware of his or her personal capabilities,
- For extreme cases, seek guidance and assistance from the local FSDO.

Risk-Management Issues

Risk-management issues can be more difficult to identify and correct than skill-based issues. For this reason, instructors must have specific strategies for assessing a pilot’s capacity to manage risk and be capable of providing experiences that positively change poor pilot behavior.

Here is a list, not inclusive, of specific behaviors that can be observed in pilots that have risk-management issues.

- Fails to conduct normal pre-flight activities such as weather assessment, fuel planning, or becoming familiar with local procedures, DPs, NOTAMs, etc,
- Can be easily convinced or influenced to fly into unsafe weather situations such as icing, low clouds, high winds, etc,

- Does not make alternate plans when departure, enroute, or destination weather is marginal and/or deteriorating,
- Intentionally does not follow best operating practices or recommended procedures,
- Intentionally operates the aircraft outside of weight and balance limitations,
- Hastily makes decisions or takes action without considering pertinent and vital information,
- Knowingly accepts unusually high levels of risks. For example, buzzing friends and family or ‘scud running’ are high-risk maneuvers that have an unacceptable probability of catastrophe. Pilots who frequently engage in these activities put themselves and their passengers in grave danger.

Strategies

Incorporating FITS training methodology into training courses will help instructors assess and develop risk management skills. When gaps of risk management skills are identified use the following strategies for dealing with the situation:

- Encourage the pilot to complete risk management courses available through the AOPA Air Safety Foundation. Visit www.aopa.org for more information. This strategy may have variable results but can be effective for some situations,
- Pilots are often able to identify risks and implement appropriate mitigation strategies for scenarios presented and discussed on the ground. Dissecting relevant accidents found in the NTSB accident database can be a useful exercise for a couple reasons. First, the pilot will be more open to discussing errors made by other pilots. Second, consequences of poor decisions are observable while dissecting accidents, particularly relevant fatal accidents that can be correlated to specific pilot behaviors. The exercise objective is to have the delinquent pilot become aware of his or her negative behavior and make appropriate changes,
- Pilots that intentionally conduct high risk activities are often difficult to approach. A pointed discussion may be necessary to prevent disaster. For this conversation to be effective, incorporate these tactics. First, it may be necessary to find a pilot or instructor that is respected by the delinquent pilot to lead the discussion. Second, convey to the pilot that many people are

aware of and concerned about his or her risky behavior. Third, display general concern for the well-being of the pilot and his or her family. Be prepared for the relationship with the delinquent pilot to be severed,

- For extreme cases, seek guidance and assistance from the local FSDO.

Conclusion of Training

Cirrus training is only complete after the Cirrus pilot demonstrates knowledge and proficiency of all course objectives, and when the applicable course minimums are met.

Certificates of completion should be presented to the Cirrus pilot after a Cirrus course is completed. Electronic copies of the completion certificate can be found at the Cirrus Training Portal. Certificates of completion are commonly used by insurance companies as verification that training has been completed.

All pilots are strongly encouraged to engage in regular recurrent training. At the conclusion of training, assist the Cirrus pilot in developing a plan for the next recurrent training event. It is recommended to schedule a date and time for the next training event as well as discussing the objectives and benefits of recurrent training.

Pilots should have a clear understanding of their capabilities and personal minimums at the conclusion of training. Discuss the actual conditions experienced during training, including: cloud bases, time spent in actual IMC, wind conditions, turbulence, icing conditions, etc. Personal minimums are based upon many factors, but pilots should always reflect on prior and recent flight experiences. Encourage and help pilots to clearly define and record their personal weather minimums. Resources to aid in defining personal weather minimums are available within this document and at www.faasafety.gov.

Cirrus Partnership Benefits

Cirrus values the significant impact that Cirrus Training Partners have on the safety of Cirrus pilots worldwide. Cirrus is proud to support its training partners with the program benefits listed below. It is the responsibility of the Training Partner to maximize the value of the benefits.

- Obtain exclusive access to the latest Cirrus training materials and product information via the Cirrus Training Portal,
- Utilize a host of Cirrus-specific computer based courses and instructional tools,
- Enjoy discounts on purchases from the Cirrus Connection pilot shop,
- Use Cirrus corporate marketing support and tools,
- Take advantage of the special Cirrus Training Partner Referral Program available only to our training partners,
- Enjoy promotion as a Cirrus Standardized Instructor Pilot or Cirrus Training Center through the Cirrus website,
- Receive an invitation to annual symposiums and periodic training communication from Cirrus developed for the Cirrus Training Network,
- Exclusive access to the Cirrus Accepted Syllabus program.

Marketing Resources

In an effort to help your business succeed, Cirrus also offers unique marketing resources and tools only available to Cirrus partners. Please visit the Cirrus Training Portal to access the Cirrus Partner Marketing Resources and Cirrus Online Partner Store documents for more information.

Cirrus Accepted Syllabus

The Cirrus Accepted Syllabus program established in 2010 allows Cirrus Training Partners to submit a training syllabus to Cirrus Aircraft for review and acceptance. Accepted syllabi will receive a dedicated logo for recognition. This program is of great benefit to Cirrus Training Partners because it allows an increased number of syllabi to be used by all Cirrus Training Partners.

In an effort to increase the resources and tools available to all Cirrus Partners, Cirrus Aircraft requests that Training Partners allow their Cirrus Accepted syllabi to be posted on the Cirrus Training Portal. Access to the Cirrus Accepted syllabi is only granted to Cirrus Training Partners. This feature is optional, at the discretion of the Cirrus Training Partner.

To be considered for acceptance each syllabus must have the following attributes:

- Clearly defines course objectives and completion standards,
- Appropriately uses FITS instructional techniques,
- Provides sufficient guidance for the instructor and Cirrus pilot to complete the course as intended,
- Includes only Cirrus-approved maneuvers and procedures,
- Serves a need specific to pilots flying Cirrus aircraft,
- Follows the guidance provided in the Flight Operations Manual, Instructor Edition,
- Provides that all course, lesson, and task objectives are organized in a logical manner to promote learning efficiency,
- The main course objectives in the syllabus are substantially different than current syllabi offered by Cirrus Aircraft,
- Syllabus is specific to Cirrus aircraft or generic to aircraft make or model. Syllabi that reference aircraft makes or models other than Cirrus aircraft will not be accepted.

Information about submitting a syllabus for approval can be found at the Cirrus Training Portal.

General

Reference Materials

The following references supplement the content of this publication:

- Federal Aviation Regulations (FARs) or governing regulations, as applicable,
- Aeronautical Information Manual (AIM),
- FAA Approved Airplane Flight Manual (AFM) and Pilot's Operating Handbook (POH),

- FAA Handbook of Aeronautical Knowledge and Airplane Flying Handbook,
- Advisory Circulars,
- Cirrus Aircraft Envelope of Safety,
- Cirrus Syllabus Suite,
- Avionics Pilot Guides and Manuals,
- Aircraft Maintenance Manual,

Terms and Abbreviations

The following terms and abbreviations will be referenced in this manual.

AP	Autopilot
ATC	Air Traffic Control
CAS	Crew Alert System
DA	Decision Altitude
ETA	Estimated Time of Arrival
ETE	Estimated Time Enroute
FAA	Federal Aviation Administration
FAF	Final Approach Fix
FIKI	Flight Into Known Ice
FITS	FAA Industry Training Standards
FMS	Flight Management System
GPH	Gallons Per Hour
GNS	Global Navigation System
GS	Glide-slope
Hg	Mercury
IAF	Initial Approach Fix
IAP	Instrument Approach Procedure
LNAV	Lateral Navigation
LPV	Localizer Performance with Vertical Guidance
MAP	Missed Approach Point
MDA	Minimum Descent Altitude
MFD	Multi Function Display
MP	Manifold Pressure
NAS	National Airspace System
NH	No Hazard Anti-Ice System
PFD	Primary Flight Display

PIC	Pilot in Command
RPM	Revolutions Per Minute
SRM	Single Pilot Resource Management
VNAV	Vertical Navigation
VTF	Vectors to Final
WAAS	Wide Area Augmentation System
SR20	Cirrus SR20 equipped with Cirrus Perspective avionics
SR22	Cirrus SR22 with normally-aspirated engine equipped with Cirrus Perspective avionics. SR22 may also represent SR22, SR22TN, SR22T, and SR22 G5 aircraft when SR22TN or SR22T is not distinctively noted.
SR22TN	Cirrus SR22 with Tornado Alley Turbonormalized engine equipped with Cirrus Perspective avionics.
SR22T	Cirrus SR22T with TCM Turbocharged engine equipped with Cirrus Perspective avionics. SR22T may also represent SR22T G5 aircraft when SR22T G5 is not distinctively noted.
SR22 G5	Cirrus SR22 G5 equipped with Cirrus Perspective avionics and a maximum certified takeoff weight of 3600 pounds. SR22 G5 may also represent SR22T G5 when SR22TG5 is not destinctively noted.
SR22T G5	Cirrus SR22T G5 equipped with Cirrus Perspective avionics with a maximum certified takeoff weight of 3600 pounds.

Contact Information

Flight Training Department	800.921.2737
	training@cirrusaircraft.com
Sales Department	888.750.9927
	info@cirrusaircraft.com
Air Safety and Maintenance Hot line	800.921.2737
	218.788.3400
CSIP or Training Center Inquiries	csip@cirrusaircraft.com

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Section 2
General Operating Procedures

General

This section should be used as a supplement for the planning and execution of all flights in Cirrus aircraft. Although an excellent resource, this information will not guarantee a safe flight. Minimizing flight risk requires sound judgment and sensible operating practices. Safety of flight ultimately depends upon the decisions made by you, the pilot.

Safe flights should be conducted in accordance with regulations, ATC clearances, personal capabilities, and the aircraft operating limitations described in the FAA Approved Airplane Flight Manual and Pilot's Operating Handbook (POH). For operations outside the United States, refer to the appropriate regulations for that country. This publication should be in the pilot's possession during all flight operations.

Instructor notes

Most flight regulations are in place to protect pilots from unsafe situations. Although flight regulations provide a framework for safe operation, pilots must go beyond minimum training and currency requirements to develop the necessary proficiency to operate safely. Developing good judgement and habits formed from proven operating procedures are important to keep pilots out of trouble.

The decisions made by a pilot before a flight are as critical as many in-flight decisions.The guidance in this section is procedural in nature and will assist Cirrus pilots in developing good habits and sound decision making skills. Strongly encourage Cirrus pilots to reference the contents in this section while planning and executing flights. Discuss this section during normal pre-flight briefings with emphasis on weather planning, personal minimums, pilot currency, etc.

The information in Section 2 is very valuable, however the Instructor Notes in Section 2 are limited because the information hereinafter is basic with little need for further explanation.

Pilot Qualification and Training

The pilot in command of any Cirrus aircraft is responsible for its safe operation. It is recommended that all pilots operate in accordance with the policies and procedures prescribed within this publication. In no case does this document relieve the pilot in command from the responsibility of making safe decisions regarding the operation of the aircraft.

Initial Training

Cirrus pilots should satisfactorily complete the Cirrus Transition Training Course, Advanced Transition Training Course, Avionics Differences, Airframe and Power Plant Differences, or the Cirrus Standardized Instructor Pilot (CSIP) course prior to acting as pilot in command of a Cirrus aircraft.

• Note •

Instrument rated pilots should complete an instrument proficiency check (IPC) prior to flying in IMC.

•

Additional Qualification and Differences Training

Cirrus pilots should complete differences training when changing airframes, power plants, avionics, or other features that require an additional qualification. Differences training can be accomplished with a Cirrus Factory Instructor, Cirrus Training Center (CTC), or Cirrus Standardized Instructor Pilot (CSIP). Differences training emphasizes changes to equipment or capability and is designed for proficient pilots who have previously completed initial transition training.

Differences courses fall into two categories:

Airframe and Power plant

- SR22/SR20 Differences,
- Turbo Differences,
- Online Icing Awareness Training.

Avionics

- Avidyne Entegra Differences,
- Cirrus Perspective Differences.

Recurrent Training

Cirrus pilots should complete recurrent training at a Cirrus Training Center (CTC) or with a Cirrus Standardized Instructor Pilot (CSIP) under the guidance found in the Cirrus Syllabus Suite. Recurrent training emphasizes aeronautical decision making, risk management, and airmanship, which leads to increased proficiency. The recurrent training program provides an opportunity to meet the requirements of a biennial flight review or instrument proficiency check.

• Note •

Instrument rated pilots should complete an instrument proficiency check every six months.

Pilot Qualification and Training for Flight Into Known Icing Conditions

The PIC must successfully complete the Cirrus Icing Awareness Course or a Cirrus Aircraft approved equivalent training course within 24 months prior to flight into forecast or known icing conditions. The Cirrus Icing Awareness Course can be purchased at www.cirrusconnection.com.

Cirrus Accepted Syllabi

Training syllabi designated with the “Cirrus Accepted” logo have been reviewed and accepted by the Cirrus Flight Standards department for use in Cirrus Training.

Training Resources

Cirrus Training Portal

Cirrus pilots can find a wealth of information regarding aircraft and avionics operation, abnormal and emergency procedures, training resources, online courses, and other software at http://training.cirrusaircraft.com.

Cirrus Owners and Pilots Association

Cirrus Owners and Pilots Association (COPA) is an organization that welcomes the membership of Cirrus owners, pilots, and enthusiasts with an interest in aviation and Cirrus aircraft issues and events. Three main training and safety related events provided by COPA are the

Cirrus Pilot Proficiency Program (CPPP), the Critical Decision Making (CDM) seminar, and the Partner In Command (PIC) seminar.

- The CPPP is designed to expose Cirrus pilots to situations they may encounter while operating their aircraft. Topics such as weather, accident review, advanced avionics, emergency procedures, and engine management are discussed and applied during a CPPP.
- The CDM seminar is a facilitated interactive hangar-flying session where the group looks at general aviation and Cirrus accident statistics, reviews case studies of Cirrus accidents, and participates in the reenactment of an actual accident.
- The PIC seminar has been designed to give frequent Cirrus passengers more knowledge regarding safety system operations in the unlikely event that the pilot in command should become incapacitated. Procedures include using basic radio communication and CAPS activation. The PIC seminar is provided by both Cirrus Aircraft and COPA.

CPPP, CDM, and PIC schedules and information can be found on the COPA web site at www.cirruspilots.org.

Medical Certificates

In order to exercise the privileges of a private pilot certificate the pilot must hold a third class medical certificate, which is valid for 24 months from the date of issue (60 months if the person is under 40.) In order to exercise the privileges of a commercial pilot certificate a pilot must hold and maintain a second-class medical certificate, which is valid for 12 calendar months from the date of issue.

Personal Minimums and Risk Assessment

Cirrus pilots will regularly assess their recent flight experience, training, and pilot certification to develop personal minimums for wind, ceiling and visibility, and instrument approach minimums. Use Figures 2.1 and 2.2 on the following pages to aid in this process.

Guidelines for Personal Weather Minimums

Use the guidance matrix, Firgure 2.1, to establish your risk category. Pilots should re-evaluate their risk category on a quarterly basis or any time a major milestone occurs. Apply this category to the recommended personal minimums found in the Envelope of Safety, Figure 2.2.

Envelope of Safety

The Envelope of Safety, Figure 2.2, describes recommended personal minimums for wind, ceiling, and visibility based on the pilot's risk category, time of day, and pilot rating. These minimums are followed by company pilots at Cirrus Aircraft.

Takeoff and Landing Wind Proficiency

A Cirrus pilot should not attempt to takeoff or land when the wind speed and crosswind component exceed the individual's capabilities.

• Note •

Cirrus pilots should use caution when attempting to takeoff or land in wind conditions with which they are not experienced.

When taking off or landing on ice-covered runways (braking action reported POOR), the crosswind component should not exceed 50% of the aircraft's demonstrated crosswind component. Use extreme caution during takeoff and landing when the wind exceeds 25 knots or the gust factor exceeds 10 knots. Land into the wind whenever possible during normal operations. When the airport layout or the type of operation requires landing with a tailwind - for example, an ILS approach - up to a 10 knot tailwind component is allowed per the Performance Section of the Pilot's Operating Handbook.

Guidance for Establishing Personal Weather Minimums

General Flight Guidelines

	1	2	3	4	5	Your Rating
Years Actively Flying (Maintained FAA req. currency)	>10	6-10	2-5		<2	
Last Recurrent Training Event	<6 months		6mo-12mo		12mo-24mo	
Certificate Held	ATP or CFI	Commercial w/instrument	Private w/instrument	Private Pilot	Solo Student Pilot	
Total Time	2000	1000-2000	750-1000	500-750	<500	
Hours logged last 12 months	>200	150-200	100-150	50-150	<50	
Hours in Cirrus last 90 days	>50	35-50	25-35	10-25	<10	
Pilot Mishap Last 24 months				Incident	Accident	
Cirrus Landings last 30 days	>10	6-9	3-5	1-2	0	
					Total	

Age: Add 2 pts for 65 years or older
Time to Achieve Private Pilot: Add 2 pts for 100+ hours
Time to Complete Transition Training: Add 2 pts for 30+ hours
Crew: Subtract 1 pt for flying with licensed pilot
Training: Add 2 pts for not completing Cirrus Transition Training

Pilot Category	
●	≥ 23
■	14-22
◆	≤13

Category ◆ Not Applicable for pilots in first 100 hours of aircraft operation.

Instrument Flight Guidelines

	1	2	3	4	5	Your Rating
Years Actively Flying IFR (Maintained FAA req. currency)	>5		1-5		<1	
Hours flown IFR last 90 days	>35	25-35	10-25	5-10	<5	
Simulated/Actual instrument hours in Cirrus in last 90 days	>3		1-3		<1	
Instrument Approaches with use of Autopilot last 90 days	>4		1-4		0	
Hand-flown Instrument Approaches last 90 days	>2		1		0	
Recieved avionics specific IFR training from CSIP/CTC	Yes				No	
					Total	

Crew: Subtract 1 pt for flying with licensed pilot
Training: Subtract 2 pts for completing avionics specific IPC from CSIP/CTC in last 12 months.

Pilot Category	
●	≥ 19
■	8-18
◆	≤7

CIRRUS AIRCRAFT

Figure 2-1
Guidance for Establishing Personal Weather Minimums

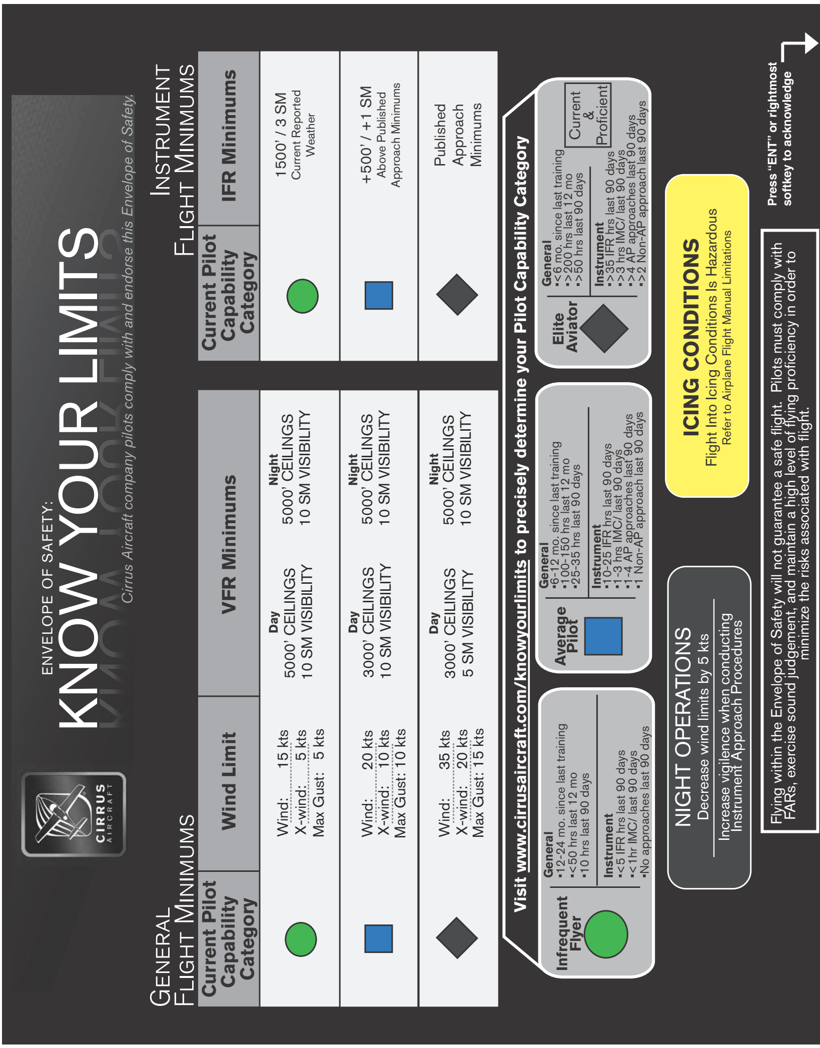


Figure 2-2
Envelope of Safety

Currency Requirements

VFR

Cirrus pilots should maintain VFR currency by completing each of the following items in a Cirrus aircraft:

- The Cirrus Transition Training course,
- 3 takeoffs and 3 landings to a full stop within the previous 60 days,
- 10 hours as the PIC within the previous 60 days,
- The training events outlined in the Cirrus Syllabus Suite.

Cirrus pilots should fly with a Training Center Instructor (TCI) or with a CSIP to meet the flight currency requirement if currency lapses. Completion of training events outlined in the Cirrus Syllabus Suite will also restore flight currency.

IFR

Cirrus pilots should maintain IFR currency by completing each of the following items in a Cirrus aircraft:

- VFR currency requirements,
- An IPC with CTC instructor or a CSIP within the previous 6 months,
- 3 instrument approaches in actual or simulated instrument conditions within the previous 60 days.
- For low-IMC currency, demonstrate the ability to execute an instrument approach to minimums within the previous 60 days.

• Note •

Initial low-IMC currency should be obtained with a TCI or a CSIP.

Pilot Duty and Rest Period

Duty Time and Rest

Pilots should avoid a duty period greater than 14 hours, including a maximum of 8 hours of flight instruction. A pilot should have a 10 hour rest period prior to flying the following day. Pilots should consider non-flight related working-periods as duty time.

Physiological Considerations

Intoxicants

A pilot should not consume alcohol or other intoxicants within 12 hours prior to flying and should always consider the lasting effects of alcohol the following day.

Blood Donations

A pilot should not operate an aircraft within 72 hours after a blood donation or transfusion due to temporary lowering of oxygen carrying capacity of blood following a blood donation or transfusion.

Scuba Diving

A pilot or passenger who intends to fly after scuba diving should allow the body sufficient time to rid itself of excess nitrogen absorbed during the dive. The recommended wait times are as follows:

- Wait 12 hours - if flight will be below 8,000 feet pressure altitude *and* dive did not require a controlled ascent.
- Wait 24 hours - if flight will be above 8,000 feet pressure altitude *or* dive required a controlled ascent.

Supplemental Oxygen

Pilots are encouraged to utilize supplemental oxygen when operating aircraft above 10,000 feet MSL during the day or above 5000 feet MSL during night time per AIM recommendations. Reference 14 CFR 91..211 for regulatory oxygen requirements.

Aircraft Maintenance and Airworthiness

Cirrus aircraft owners and operators are to maintain their aircraft in accordance with the Instructions for Continued Airworthiness found in the Airplane Maintenance Manual. Aircraft maintenance should be completed at a Cirrus Authorized Service Center.

There is a worldwide network of Cirrus authorized professionals who are trained to maintain Cirrus aircraft. Cirrus Authorized Service Centers are available for regularly scheduled aircraft maintenance or needed repairs. A complete listing of service centers is available at http://www.cirrusaircraft.com.

If a Cirrus aircraft is damaged or encounters mechanical difficulty that is hazardous to flight or ground operations away from home base, the pilot should land as soon as practical and not attempt to takeoff. The pilot should secure the aircraft and contact a Cirrus Authorized Service Center or call the Cirrus Service Hot line 800.279.4322. The purpose of this call is to assist the pilot in analyzing the problem, determine the best solution, and develop a plan of action.

Grounding of Aircraft

A Cirrus pilot or mechanic has the authority to ground an aircraft anytime it is determined to not be airworthy. Inform other pilots who may fly the aircraft that the aircraft is unairworthy.

Flight Planning

Pilots are encouraged to file VFR or IFR flight plans for all cross-country flights. Pilots should always plan an alternative course of action, whether operating VFR or IFR.

The pilot should complete the following flight planning responsibilities:

- Determine the best route and altitude considering: winds aloft, freezing levels, cloud bases and tops, turbulence, terrain, airspace and TFRs,
- Determine an alternate airport,
- Calculate fuel requirements,
- Verify aircraft is within weight and balance limitations,
- Verify adequate climb performance for departure procedures,
- Calculate takeoff and landing distances. Verify runway lengths for intended airports,
- File flight plan.

Weather Assessment

Pilots should determine if the weather conditions exceed their qualifications and capabilities. A decision should be made to postpone the flight if the weather is not acceptable. Flight planning should continue if the weather is acceptable.

• Note •

To facilitate flight planning, the U.S. Government provides a free Direct User Access Terminal Service (DUATS) for all licensed pilots at www.duats.com or www.duat.com.

IFR Alternate Airport Weather Requirements

If from 1 hour before to 1 hour after the estimated time of arrival at the destination airport, the weather is forecast to be at least 2,000 foot ceilings and 3 mile visibilities, no alternate is required, though it is important to be familiar with the area in case a diversion is required. If forecasted weather conditions are less than 2,000 feet and 3 miles, an alternate must be filed.

A pilot may only include an alternate airport in an IFR flight plan when appropriate weather reports or forecasts, or a combination of them, indicate that, at the estimated time of arrival at the alternate airport, the ceiling and visibility at that airport will be at or above the following weather minima:

- For a precision approach procedure: Ceiling 600 feet and visibility 2 statute miles.
- For a Non-precision approach procedure: Ceiling 800 feet and visibility 2 statute miles.

If an instrument approach procedure has not been published for the intended destination, the ceiling and visibility minima are those allowing descent from the MEA, approach and landing under basic VFR conditions and an alternate airport must be filed.

Fuel Requirements

No person may operate an aircraft in IFR conditions unless there is enough fuel (considering weather reports, forecasts, and weather conditions) to:

- Complete the flight to the first airport of intended landing,
- Fly from that airport to the alternate airport,
- Fly after that for 45 minutes at normal cruising speed.

No person may begin a flight in an aircraft under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing (assuming normal cruising speed and fuel burn) and at least an additional 45 minutes beyond that point in either day or night conditions.

Minimum Runway Length

Cirrus pilots are encouraged to operate using a minimum runway length of 2,500 feet or twice the expected takeoff and/or landing distance, whichever is higher. Cirrus pilots should receive short-field takeoff and landing instruction prior to operating on runways that are shorter than 2,500 feet.

Oxygen Equipment

Prior to flight, pilots should thoroughly understand and brief passengers on how to use oxygen equipment and on signs of hypoxia.

<u>Pulse Oximeter</u>

Pilots are encouraged to use a pulse oximeter to monitor oxygen saturation of the blood. Pilots should adjust the flow rate of oxygen to maintain a minimum of 90% saturation. If saturation cannot be maintained above 90%, pilots should descend appropriately.

Oxygen Cannula

Oxygen cannulas may be used at any altitude below 18,000 feet. Users should ensure that breathing is through the nose and not the mouth. Eating or excessive talking may reduce oxygen saturation levels.

Oxygen Mask

Oxygen masks must be worn above 18,000 feet MSL. Masks should be properly fitted to each individual face prior to flight. Loose-fitting masks or facial hair may reduce the effectiveness of the mask and reduce oxygen saturation levels.

Weather Planning

A critical factor in a successful flight is the pilot's evaluation of weather conditions. Many weather related accidents are avoidable and could have been prevented during pre-flight if the pilot thoroughly evaluated the weather conditions. The following weather resources will be useful for evaluating the weather:

Flight Service Station: 800-WX-BRIEF

Aviation Weather Center .... www.aviationweather.gov

FlightPlan.com... www.fltplan.com

ForeFlight .... www.foreflight.com

National Weather Service...................................... www.nws.noaa.gov

The go/no-go decisions and the route to the intended destination depend greatly on the weather at the departure airport, along the route, and at the destination. The pilot's ability to interpret and understand aviation weather is critical to the safety of flight. Follow the steps below when assessing the weather for every flight.

Overview

The first step to understanding the weather conditions along the intended route is to assess the big picture. The pilot should become familiar with pressure systems, frontal systems, precipitation, areas of marginal VFR and IFR conditions, and areas of icing and turbulence. Available weather products include:

- Surface analysis chart,
- Weather radar,

- Satellite imagery.

Hazards to Flight

The second step is to identify any potential hazards for the intended flight. The pilot should become familiar with areas of marginal VFR and IFR conditions, convective activity, and areas of icing and turbulence. Available weather products include:

- Weather depiction chart,
- AIRMETs, SIGMETs and Convective SIGMETs,
- Weather radar,
- Pilot reports,
- Area forecast,
- Current and forecasted icing potential.

Current Observations

The third step is to become familiar with the current observations along the intended flight. Current weather observations within 50 miles of the departure, intended route and destination airport should be analyzed. Available weather products include:

- METARs,
- Pilot reports.

Forecasted Weather

The fourth step is to understand what the weather is expected to do during your flight. Evaluate the weather +/- 2 hours from your estimated time of arrival at the destination and planned alternate. Available weather products include:

- TAFs,
- Area forecast,
- Prognostic charts,
- Winds and temperature aloft,
- AIRMETs, SIGMETs and Convective SIGMETs.

NOTAMS

The fifth step is to become aware of any NOTAMs that may affect the flight. Pay close attention to any TFRs that may interfere with your route.

Thunderstorm Flying

Never regard a thunderstorm lightly, even when radar observations report that echoes are of light intensity. Avoiding thunderstorms is the best policy. The following are some Do’s and Don'ts of thunderstorm avoidance:

- Don't land or takeoff in the face of an approaching thunderstorm. A sudden gust front or low level turbulence could cause loss of control.
- Don't attempt to fly under a thunderstorm even if you can see through to the other side. Turbulence and wind shear under the storm could be disastrous.
- Don't trust the visual appearance to be a reliable indicator of the turbulence inside a thunderstorm.
- Do avoid by at least 20 miles any thunderstorm identified as severe or giving an intense radar echo. This is especially true under the anvil of a large cumulonimbus cloud.
- Do circumnavigate the entire area if the area has 6/10 thunderstorm coverage.
- Do remember that vivid and frequent lightning indicates the existence of a strong thunderstorm.

Regard as extremely hazardous any thunderstorm with tops 35,000 feet or higher, whether the top is visually sighted or determined by radar.

Temperature Minimums

Flight training operations should not be conducted when the outside air temperature falls below -20 degrees Fahrenheit. Cirrus aircraft should be pre-heated if exposed to ground temperatures below 20 degrees Fahrenheit for more than two hours. Do not operate the engine at speeds above 1700 RPM unless oil temperature is 75 degrees Fahrenheit or higher and oil pressure is within specified limits of 30-60 PSI. When oil temperature has reached 100 degrees Fahrenheit and oil pressure does not exceed 60 PSI at 2500 RPM, the engine has been warmed sufficiently to accept full rated power.

Operations in Icing Conditions

• Caution •

Flight into icing conditions is hazardous. Refer to the airplane flight manual for limitations.

A pilot is prohibited from taking off in an aircraft that has frost, snow, slush, or ice adhering to any external surface.

Icing can be expected when flying in visible moisture, such as rain, snow, or clouds, and the temperature of the aircraft is below freezing. If icing is detected, a pilot should turn on all available anti-icing equipment and do one of two things to exit the icing condition: get out of the area of visible moisture, or go to an altitude where the temperature is above freezing. The warmer altitude may not always be a lower altitude. Proper pre-flight action includes obtaining information on the freezing levels. Report icing to ATC and request new routing or new altitude if icing is encountered.

Cirrus aircraft that are certified for Flight Into Known Icing (FIKI) conditions must operate within criteria defined by FAR Part 25, Appendix C. These conditions do not include, nor were tests conducted in all icing conditions that may be encountered such as freezing rain, freezing drizzle, mixed conditions, or conditions defined as severe. Flight in these conditions must be avoided. Some icing conditions not defined in FAR Part 25 have the potential of producing hazardous ice accumulations, which exceed the capabilities of the airplane's anti-ice system, and/or create unacceptable airplane performance including loss of control. Pilots who encounter icing conditions that are outside the FAR defined conditions should divert the flight promptly. Inadvertent operation in these conditions may be detected by unusually extensive ice accumulated on the airframe in areas not normally observed to collect ice.

If the airplane encounters conditions that are determined to contain freezing rain or freezing drizzle, immediately exit the freezing rain or freezing drizzle conditions by changing altitude, turning back, or even continuing on the same course if clear air is known to be immediately ahead.

Flight Considerations

Turns after Takeoff

The recommended turn altitude after takeoff is a minimum of 400 feet AGL, unless obstacle departure procedures or ATC instructions dictate otherwise. When cleared to fly runway heading, pilots should maintain the heading that corresponds with the extended center line of the departure runway until otherwise directed by ATC. Drift correction should not be applied: i.e., Runway 04, with an actual magnetic heading of the runway center line being 044 degrees, fly 044 degrees.

Noise Abatement

When operating out of noise sensitive airports pilots are encouraged to follow local noise abatement procedures and consider an RPM reduction from 2700 RPM to 2500 RPM during the climb if necessary and safe. A power reduction in an SR22T has little effect on outside noise levels and is not necessary for noise abatement.

Weather Status

Pilots should monitor the weather along the route and destination airport for deteriorating conditions using onboard weather resources and ground based weather resources. En route Flight Advisory Service (EFAS), Flight Watch, is generally available on 122.0 anywhere in the contiguous United States. A diversion may be necessary if the weather deteriorates beyond the pilot's qualifications or capabilities.

Aircraft Systems Status

Pilots should monitor the flight, engine and system parameters throughout the flight. Verify adequate fuel remains to reach the intended destination and switch fuel tanks as required to maintain within maximum fuel imbalance requirements.

Pilot Status

Pilots should monitor fatigue and stress levels during the flight. A diversion may be necessary if the pilot has any reason to believe the flight can not be completed safely. Manage cockpit workload according the procedures described in Section 3 of this manual. Pilots flying above 10,000 MSL should monitor oxygen saturation levels with a pulse oxymeter frequently. Adjust oxygen flow rates or altitude to maintain oxygen saturation levels above 90%

Post Flight Inspection

Pilots are encouraged to conduct an abbreviated inspection after each flight in order to identify maintenance issues that may have occurred during flight. A post flight inspection may allow the pilot to identify and resolve any AOG maintenance issues and reduce aircraft downtime. Pilots should pay attention to the following items during a post flight inspection:

1. Main landing gear .... Inspect

   Inspect the brake temperature sticker and general tire condition. Verify there are no brake fluid leaks.

2. Leading edge surfaces.. Inspect

   Inspect for signs of impact or damage from a possible bird strike.

3. Upper and lower fuselage .... Inspect

   Inspect for signs of excessive oil leak, and condition of external antennas.

Flight Safety

In addition to the operating limitations specific to each aircraft type, the following actions are not recommended:

- Parachuting activities,
- Hand propped engine starts,
- Flight below 500' AGL except for takeoff and landing,
- Flight over water beyond the safe gliding distance of land is not recommended.

• Note •

Pilots should ensure that adequate survival gear is readily accessible if flight over water beyond the safe gliding distance to land is required.

Sterile Cabin

During sterile cabin operations all distractions such as music, non-flight related activities, and unnecessary communication with passengers should be minimized. A sterile cabin should be observed during departure, arrival, and abnormal/emergency operations.

Smoking

Smoking is prohibited inside or near aircraft, hangars, and ramp areas. It is the responsibility of the pilot to ensure that passengers comply with these restrictions.

Collision Avoidance

The pilot shall maintain vigilance for other aircraft and use all resources available to avoid any situation which could result in a collision. Pilots are encouraged to file an IFR flight plan or request traffic advisories or flight following when operating in a radar environment.

Passenger Flight Briefing

The pilot shall provide a safety briefing, referencing the Passenger Briefing Card, to all passengers prior to each flight. The briefing shall provide instructions for the following:

- CAPS procedures in the event of a pilot incapacitation,
- Seat belts,

- Exits,
- Safety equipment on the aircraft,
- Sterile cabin procedures.

International Border Operations

Pre-Flight

- Appropriate charts and flight supplements

Personal Documentation

- Pilot certificate with “English Proficient” endorsement,
- Medical certificate,
- FCC Restricted Radiotelephone Operator Permit,
- Proof of citizenship,
    - Passport,
    - Resident alien ID Card (if required),
- Other Visa documentation as required,
- Notarized letter authorizing children to fly (if accompanied by only one parent).

Aircraft Documentation

- Airworthiness certificate,
- Registration certificate (not temporary registration certificate),
- Operating limitations (approved aircraft flight manual),
- Weight and balance information,
- FCC Aircraft Radio Station License,
- Proof of liability insurance for the specific country,
- U.S. Customs Annual User Fee Decal (Form 339A),
- FAA Form 337 (U.S. aircraft only) or STC documentation if fuel tanks have been added in baggage or passenger compartments,
- Experimental Aircraft - Standardized Validation (for operations in Canada) or Special Flight Authorization (for operations in U.S.).

Crossing the United States and Canadian Border

Departure

- Provide passenger manifest to U.S. Customs using Electronic Advance Passenger Information System (eAPIS) at least 1 hour prior to departing from or arriving in the United States,

  - https://eapis.cbp.dhs.gov,
- Give advance notification to Customs,
  - U.S. to Canada - contact CANPASS no less than 2 hours before and no more than 48 hours before arrival at 888-CAN-PASS (226-7277),
  - Canada to U.S. - telephone Customs office at airport of entry no less than 1 hour and no more then 23 hours before arrival; enter ADCUS in Remarks block of flight plan form,
- File and activate a VFR or IFR flight plan,
- Advise Customs if any change in ETA at airport of entry via ATC/FSS while in flight, and get the badge number and name of the Customs official that ATC/FSS is communicating with.

Arrival

- Make first landing at an airport of entry (AOE),
- Taxi to the Customs area on ramp,
  - In the U.S. - Arrive at the destination at or within 15 minutes of your planned ETA. Wait in the aircraft for the Customs official to motion you out of aircraft,
  - In Canada - if not met, find a telephone and call 888-CAN-PASS, follow directions from Customs official, obtain arrival report number,
- If inspected, present documentation as required, fill out any declaration forms and pay appropriate duties and taxes,
- Close your flight plan.

Incident and Accident Procedures (U.S. Only)

Pilots shall immediately notify the nearest National Transportation Safety Board field office if an aircraft incident or accident occurs as defined in NTSB Part 830. The proper law enforcement agency and/or search and rescue shall be notified if necessary. The pilot should complete the Aircraft Accident and Incident Report, found in this section, after any incident or accident. The pilot should not discuss the circumstances with anyone not involved with the investigation.

Emergency Landing

If a Cirrus aircraft makes an emergency landing at a site not designated as an airport, the pilot should not attempt to takeoff, but should immediately contact the proper authorities.

Aircraft Incident and Accident Notification

An Aircraft Incident and Accident Report should be completed by the pilot any time a Cirrus aircraft sustains any damage or is involved in an incident or accident. The information may be useful in a future investigation. The report form is found in this manual.

NTSB Field Offices

Eastern Region

Atlanta, GA 404-562-1666

Miami, FL..305-597-4610

Ashburn, VA 571-223-3930

Central Region

Chicago, IL 630-377-8177

Denver, CO...303-373-3500

Arlington, TX...817-652-7800

Western Region

Seattle, WA...206-870-2200

Gardena, CA 310-380-5660

Alaska Region

Anchorage, AK 907-271-5001

Aircraft Incident and Accident Report

Date of accident:______________Time: __________________________

Pilot's Name: ________________Phone No:______________________

Owner and/or Operator: _______________________________________

Aircraft Type:_________________ N#: ___________________________

Type of Event (circle one): Accident Incident Damage

Last point of departure: _______________________________________

Point of intended landing: ______________________________________

Position of aircraft in reference to an easily defined geographical point:

____

____

Number of persons aboard: _____ Fatalities: ____ Injured:__________

Description of injuries: (if applicable):____________________________

____

____

Names of passengers: ____

____

____

Weather conditions (attach weather print-off if available):

Wind Direction: _______________Wind Velocity:___________________

Visibility: _____________________Sky Condition:___________________

Temp/Dew point:______________Altimeter Setting:_________________

Other____

Eye Witnesses:

Name	Phone Number
1.___________________________	_____________________________
2.___________________________	_____________________________
3.___________________________	_____________________________

Damage to Aircraft/Property (If yes, explain): ____________________

Description of any dangerous cargo:____________________________

Detailed explanation of incident, accident, or damage:_____________

Section 3
Standard Operating Procedures

General

The Standard Operating Procedures section describes the recommended procedures when operating a Cirrus aircraft during visual and instrument conditions. This information should serve as a framework for aircraft and avionics management. These standard operating procedures were developed by and are used by professional pilots and flight instructors at Cirrus Aircraft. The procedures outlined are considered the best operating practices while flying Cirrus aircraft; however, these procedures may not be inclusive to all variables encountered in the national airspace system. Cirrus pilots are encouraged to follow the procedures outlined in this manual, use their best judgment, and adapt these procedures when handling non-standard situations.

• Note •

Checklist procedures in the FOM have been designed to accommodate all aircraft equipped with Cirrus Perspective avionics. In each checklist, items that are specific to only certain aircraft will be noted in each procedure. Unless specified, items will apply to all aircraft with Cirrus Perspective avionics.

Utilizing these standard operating procedures will enhance the situational awareness of the pilot in both single pilot and crew situations and allow for timely completion of tasks in the aircraft. Adhering to these procedures will help the pilot take full advantage of the aircraft's capabilities while maintaining a high level of safety.

• Note •

Procedures in this publication are derived from procedures in the FAA Approved Airplane Flight Manual (AFM). Cirrus Aircraft has attempted to ensure that the data contained agrees with the data in the AFM. If there is any disagreement, *the Airplane Flight Manual is the final authority*.

Single Pilot Resource Management

Single Pilot Resource Management (SRM) is the ability to manage all the resources available to a pilot to ensure that the successful outcome of the flight is never in doubt.

The majority of Cirrus aircraft operations are conducted as single-pilot. The workload associated with flying the aircraft, configuring and monitoring avionics, communicating with air traffic control, and decision making requires pilots to efficiently manage all tasks while maintaining positive aircraft control at all times. The following SRM procedures have been adapted from cockpit procedures common to dual pilot transport category aircraft.

General aviation pilots have a great deal of latitude on how to manage and operate aircraft. To ensure the highest levels of safety, it is strongly recommended that these single pilot operating procedures be incorporated into the operation of the aircraft.

Priority of Tasks

The following is a list of priorities that apply to any situation encountered in flight. Pilots must adhere to these priorities during every flight.

1. Maintain Aircraft Control

   The number one priority of the pilot is to maintain aircraft control. Pilots should maintain a high level of vigilance during periods of high and low workload to ensure aircraft control is always maintained.

2. Navigation

   Once aircraft control is assured, pilots should set and verify that the avionics are correctly configured for navigation. This task includes creating and modifying flight plans, selecting proper navigation sources and/or tuning navigation frequencies. Use of the autopilot may assist the pilot with accomplishing these tasks. Pilots should monitor flight parameters closely while programming various avionics equipment.

3. Communication

   Communication is an important task in the aircraft but follows aircraft control and navigation as a priority. This task includes setting assigned frequencies, controlling communication volume and responding to ATC instructions. Communicate intentions and relay instructions clearly to ATC/CTAF while maintaining aircraft control.

• Note •

Using Standard Operating Procedures will aid the pilot in timely completion of required tasks and allow the pilot to maintain high levels of situational awareness.

Using Standard Operating Procedures

The use of Standard Operating Procedures will allow for single-pilot operations with higher levels of safety and efficiency. Following standard procedures during flight operations will develop habit patterns through repetition that allow pilots to be most efficient while completing tasks and configuring the aircraft for various phases of flight. Section 3 of this manual details and describes the recommended procedures for operating a Cirrus aircraft in a normal flight environment for both VFR and IFR operations.

Use of All Available Resources

The use of all available resources during flight in single-pilot operations will allow pilots to make better and more timely decisions. Many resources are available to pilots such as: ATC, Flight Watch or Flight Service Stations, on-board weather displays, on-board chart displays, and even passengers.

Collision Avoidance

It is the responsibility of the pilot in command to see and avoid other aircraft. Pilots should use care during all movement on the ground. Read back all hold short instructions and visually verify that runways are clear prior to crossing. Use of SafeTaxi and/or Charts will increase the pilot's situational awareness during movement on the ground.

While in visual conditions pilots should regularly scan outside the aircraft in sweeping ten degree increments. Pilots are encouraged to use resources on board the aircraft to identify possible threats before they become a hazard. Displaying traffic on the PFD inset map will continuously assist pilots to see and avoid other traffic. Remember, non-transponder-equipped aircraft will not be detected by on-board traffic systems.

Terrain Avoidance

Pilots are at greatest risk for controlled flight into terrain (CFIT) accidents during high workload situations (departure and arrival), in unfamiliar terrain or airspace, and in restricted visual conditions (IMC or night). Chances of a loss of control or CFIT accident is greatly increased when VFR flight is continued into IMC conditions. Proper pre-flight weather planning will reduce the likelihood of accidental flight into IMC conditions. Adhere to these guidelines to reduce the likelihood of a CFIT accident.

- Verify that departure, enroute and destination weather conditions allow for safe completion of the flight,
- Become familiar with all terrain and obstacle hazards for the planned route and plan the route and altitudes accordingly,
- Become familiar with any departure procedures and brief the departure procedures prior to takeoff,
- Exercise sterile cabin procedures during high workload periods,
- Reference TAWS information in mountainous terrain. Ensure the the range is set to less than 100NM,
- Maintain situational awareness at all times using the tools onboard the aircraft including: moving map displays, TAWS, and navigation information,
- Proceed with caution and maintain high levels of vigilance when operating in unfamiliar terrain, especially during low or restricted visibility.

Instructor Notes

Developing a pilot’s single pilot resource management (SRM) skills is challenging but critical. SRM is best learned when the instructor facilitates learning situations that require the use of multiple resources to solve a problem or make a decision.

SRM skills can only be developed after the pilot understands the resources available to him or her in flight and has the awareness and skill to use these and other resources. For this reason, Cirrus courses focus on developing basic systems knowledge and skills before introducing more advanced SRM scenarios. Good scenario examples for developing and assessing a pilot’s SRM skills are found in Section 4 of this document.

Checklist Philosophy

When used properly, checklists enhance the safety of flight by confirming the aircraft is appropriately configured for the flight condition. At the same time, checklists expedite the completion of procedures that are necessary to transition to subsequent phases of flight.

The electronic checklist in the MFD should be used anytime the MFD is running. Use of electronic checklists will help keep the cockpit organized and functional. Use a paper checklist whenever the MFD electronic checklists are not available.

Classification of Checklists

All checklist procedures can be assigned one of three classifications:

Normal:	Procedures used during normal flight operations. Normal checklists can be found in the Normal Procedures section of the POH.
Abnormal:	Procedures used in response to system failures and malfunctions that, while not immediately threatening, may affect safety of flight if not addressed. Abnormal checklists can be found in the Abnormal Procedures section in the POH.
Emergency:	Procedures used in response to system failures and malfunctions that are an immediate threat to the safety of flight. Emergencies require immediate action by the flight crew to ensure a safe outcome. Emergency checklists can be found in the Emergency Procedures section of the POH.

Checklist Completion for Normal Procedures

Normal procedure checklists can be completed as a flow pattern or a do-list. The appropriate method for checklist completion for each normal procedure is indicated in the procedures section for each phase of flight.

Do-List: A do-list checklist is executed by reading the checklist item and selecting the appropriate condition of the item. Do-lists are used when procedure sequence and/or item condition is critical to completion of the procedure and when ample time exists for completion of the checklist.

Flow Pattern: The term “flow pattern” refers to a logical path through the cockpit that the pilot will move along during the execution of the checklist. Flow patterns use a “do and verify” approach to checklist completion. The items and their conditions are memorized and executed without immediate reference to the written checklist. Following completion of the flow pattern, the checklist is referenced as soon as time and workload permit to ensure procedure completion.

When used properly, flow patterns allow timely configuration of the aircraft for the appropriate flight condition. Flow patterns are used when procedure sequence and aircraft condition are not critical and there is an operational advantage to executing the checklist items in a timely manner.

Instructor Notes

CATS III has a built in checklist procedure trainer to practice normal and emergency procedures. It is a great tool to teach and learn checklist flow patterns and develop familiarity with the cockpit.

Flow patterns are best learned on the ground through practice and repetition. Learning the aircraft flow patterns for checklist completion early in training is of great benefit for the pilot. This is especially true for pilots conducting instrument training, due to the higher workloads experienced in the IFR environment.

The flow patterns for most in flight checklist procedures in Cirrus aircraft follow the same path through the cockpit starting at the center console, or home position, then sweeping up and through the avionics and switches. Reference this section for details on each checklist flow pattern.

Pre-Flight Inspection

The pre-flight inspection should be completed as a flow pattern when the pilot is familiar with the aircraft pre-flight inspection checklist. Always refer to the aircraft checklist after the flow to verify that all items have been completed.

Documentation

The following documents must be in the aircraft for the flight:

- Certificate of Airworthiness,
- Registration,
- FAA Approved Airplane Flight Manual and Pilot's Operating Handbook, including weight and balance,
- Radio Station License for International Operations,
- Appropriate Avionics Publications.

Equipment

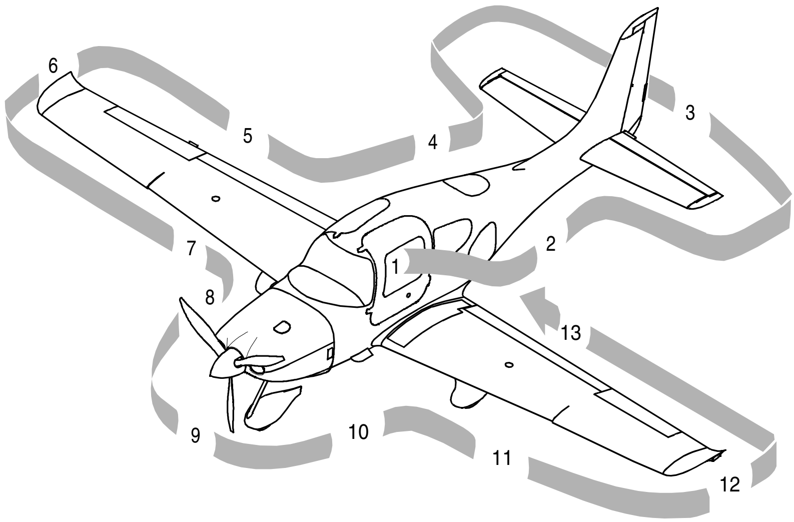
The following equipment should be carried in the aircraft when appropriate:

- Survival kit (appropriate to the climate and conditions),
- Approved flotation devices for flights over water beyond gliding distance to land,
- Supplemental oxygen system for high altitude operations,
- Chocks, tie downs, extra oil, tow bar, engine and airplane covers.

Ground Icing

A visual inspection and tactile check of the entire aircraft is required before takeoff whenever conditions conducive to ground icing are present. Pilots are prohibited from taking off in an aircraft that has frost, snow, slush, or ice adhering to any external surface.

FIKI - Dispatch into known icing conditions is prohibited if porous panels do not fully “wet-out”, or if there is a persistent annunciation of any anti-ice system crew alert system (CAS) message.



SR22_OP02_2659

Procedure (Flow Pattern)

1. Cabin

   a. Required Documents..On Board

   Ensure Airworthiness Certificate is visible to occupants, Registration Certificate, Pilot's Operating Handbook and Aircraft Weight and Balance are on board the aircraft.

   b. Avionics Power Switch..OFF

   c. Bat 2 Master Switch ....ON

   d. PFD ....Verify ON

   Verify on and alignment process beginning.

   e. Essential Bus Voltage.. 23-25 Volts

   Verify with voltmeter located on the left hand side of the PFD.

   f. Flap Position Light .... OUT

   Verify flap position light is not illuminated to ensure isolation diodes are functioning properly.

   g. Bat 1 Master Switch ....ON

   h. Avionics Cooling Fan .... Audible

Listen for cooling fan operation.

i. Oxygen Masks/Cannulas and Hoses ....Check Condition

j. Oxygen System .... ON

(1) Quantity....... Verify adequate supply for flight with reserve

(2) Flow.................................... Check flowmeter on all masks

(3) Oxygen System...OFF

k. Avionics Master Switch (FIKI)... ON

Avionics Master and audio panel must be turned on and flaps must be 100% down in order to test stall warning on ground.

l. Flaps..100%, Check Lights ON

Visually verify down and ensure light corresponds with flap setting.

m. PITOT HEAT Switch... ON

FIKI - Limit ground operations of Pitot Heat to 45 seconds. Operations of Pitot Heat in excess of 45 seconds while on the ground may cause excessive temperature on stall warning transducer faceplate and surrounding wing skin.

n. Lights ....Check Operation

Verify operation of required interior (overhead, instrument and panel lights) and exterior (navigation, landing, anti-collision, and ice lights). Strobe lights are required for all flight operations. Navigation lights are required for all night operations.

o. Stall Warning Faceplate (FIKI)..........................Perceptibly Hot

Stall warning faceplate should become hot when Pitot Heat is on. Use caution to avoid burns when checking system operation.

p. Stall Warning .... Test

Test stall warning system by applying suction to the stall warning system inlet and noting the warning horn sounds.

FIKI - Verify Stall Warning System audio annunciation operation by lifting stall warning vane with wooden tooth pick or tongue depressor. Stall warning vane should be very hot. Avionics Master and audio panel must be turned on and flaps must be 100% down in order to test stall warning on ground.

q. Pitot Heat..Perceptibly Hot

Verify the pitot tube is hot.

r. Fuel Quantity ....Check

Ensure fuel quantity is sufficient for planned flight and corresponds to fuel amount in tanks and on MFD.

s. Fuel Selector ....Select Fullest Tank

Switch fuel selector to the fullest tank. Maximum fuel imbalance: 7.5 (SR20), 10 gal SR22(T),(TN),(G5).

t. Alternate Static Source...NORMAL

Visually verify alternate static source located near pilot's right knee, above circuit breaker panel is in the NORMAL position.

u. Bat 1 and 2 Master Switches..OFF

Ensure both battery switches are turned off.

v. Circuit Breakers .... IN

Ensure all circuit breakers are in and none are in re-settable (tripped) condition.

w. Fire Extinguisher ....Charged and Available

Inspect extinguisher and ensure pin and safety wire are intact. There is no gauge to measure quantity.

x. Emergency Egress Hammer ....Available

Hammer should be stowed securely inside lid of the arm rest between the front seats.

y. CAPS Handle ....Pin Removed

Remove safety pin and stow for remainder of flight. Be sure to replace CAPS cover after pin removal as it is a required placard. Consider delaying this checklist item until all passengers are boarded and provide a passenger CAPS briefing at that time.

2. Left Fuselage

a. Door Lock .... Unlock

Ensure the door lock is in the unlocked position to allow outside entry into the aircraft in the event of an accident.

b. COM 1 Antenna...............................Condition and Attachment

Visually check condition of antenna and surrounding area of fuselage.

c. Wing/Fuselage Fairing..Check

Visually inspect the wing root fairing for attachment along upper and lower surfaces of wing root.

d. COM 2 Antenna.............................. Condition and Attachment

Visually check condition of antenna and surrounding area of fuselage.

e. Transponder Antenna .... Condition and Attachment

The transponder antenna is located on the bottom side of the airplane, just aft of the baggage compartment bulkhead on the RH side of the aircraft.

f. Baggage Door .... Closed and Secure

Physically check for locked and secured door and ensure keys are removed.

g. Static Button ....Check for Blockage

Ensure removal of static covers if used and check for any blockage within static port openings.

h. Parachute Cover...................................... Sealed and Secured

Visually inspect area on top rear of fuselage directly behind rear top window for any cracks.

3. Empennage

a. Tie Down Rope...Remove

Visually verify tail tie down is removed and stowed.

b. Horizontal and Vertical Stabilizers.............................Condition

Inspect leading edges and top of vertical stabilizer for any abnormalities. Ensure the clear tape covering inspection hole inside of elevator horn is intact.

c. Elevator and Tab...............................Condition and Movement

Check elevator for range of motion. Inspect tab on left side of elevator for condition. Visually inspect counter weight inside elevator horn for security. Check all hinges, bolts, and cotter pins.

d. Rudder..Freedom and Movement

Inspect for full range of motion. Inspect all hinges, bolts, and cotter pins from the left side of the rudder. Visually inspect counter weight inside top leading edge of rudder horn for security.

e. Rudder Trim Tab .... Condition and Security

f. Attachment Hinges, Bolts and Cotter Pins .... Secure

Verify all moveable control surfaces are secure and all bolts and cotter pins are in place.

4. Right Fuselage

a. Static Button .... Check for Blockage

Ensure removal of static covers and check for any blockage within static port openings.

b. Wing/Fuselage Fairings .... Check

Visually inspect the wing root fairing for attachment along upper and lower surfaces of wing root.

c. Door Lock .... Unlocked

Ensure the door lock is in the unlocked position to allow outside entry into the aircraft in the event of an accident.

5. Right Wing Trailing Edge

a. Flaps and Rub Strip (if installed) .... Condition and Security

Inspect flap hinges, bolts and cotter pins for security and verify a small amount of movement when flaps are in an extended position. Visually inspect rub strip for abnormal chafing.

b. Aileron and Tab .... Condition and Movement

Verify full deflection of right aileron and ensure opposite deflection of left aileron. Inspect control assemblies located near the leading edge of outboard and inboard aileron. Inspect the security of the bolt located under the inboard edge of the aileron.

c. Aileron Gap Seal .... Security

Visually inspect the aileron gap seal for attachment along the entire surface.

d. Hinges, Actuation Arm, Bolts and Cotter Pins .... Security

Verify all moveable control surfaces are secure and all bolts and cotter pins are in place.

6. Right Wing Tip
    a. Tip..Attachment

       Ensure all screws are in place on upper and lower surfaces. Visually inspect for damage to leading edge, trailing edge, and wing tip.
    b. Strobe, Nav Light and Lens ....Condition and Security

       Inspect for security of lights and lighting covers.
    c. Fuel Vent (underside) .... Unobstructed

       Verify there are no obstructions to the fuel vent.
7. Right Wing Forward and Main Gear
    a. Leading Edge and Stall Strips ....Condition

       Inspect leading edge for any abnormalities. Ensure both stall strips are secured.
    b. Fuel Cap ....Check Quantity and Secure

       Visually check fuel is at desired amount and the fuel cap is secured and locking tab is facing rearward. Lock fuel caps as desired.
    c. TKS Fluid Reservoir (FIKI) .... Verify Desired Quantity

       Check cap condition and security. Minimum dispatch level for flight into known ice is 5 gallons between the two tanks. Use only approved fluid meeting DTD-406B standards.
    d. Fuel Drains (2 underside) .... Drain and Sample

       Use a clear fuel strainer and sample fuel from the main tank and the collector tank. Visually check color for grade of fuel and inspect for contaminants. Ensure fuel drains do not leak after taking sample. Do not use the same sample cup used to drain the TKS system.
    e. TKS Fluid Vent (underside wing) (FIKI) .... Unobstructed

       Verify there are no obstructions to the TKS fluid vent.
    f. Wheel Fairings...................... Security, Accumulation of Debris

       Physically ensure security of wheel pants. Check for and remove any debris in wheel pants (ice or slush may have formed during taxi).
    g. Tire ....Condition, Inflation and Wear

Inspect tire for excessive wear to include flat spots, bald spots or visible tire chords. Ensure adequate tire inflation. Moving the aircraft may be necessary to visually inspect the entire tire for overall condition if excessive wear is suspected.

h. Wheel and Brakes .... Condition

Inspect the area directly surrounding the wheel for evidence of fluid leaks. Visually inspect brake temperature sticker for evidence of overheating. (Center of blue inspection disc is white in a normal condition, dark gray when overheated.)

i. Chocks and Tie Down Ropes .... Remove

Ensure all wheel chocks and tie down ropes are removed and stowed.

8. Nose, Right Side

a. Vortex Generator .... Condition

Inspect condition of vortex generator and ensure it has not been damaged.

b. Ice-inspection Light (FIKI) .... Condition/Security

Inspect for security of light and lighting cover. Ice lights are required for night operations in icing conditions.

c. Cowling.. Attachments Secure

Visually inspect each cam lock for secure fitting along top and side of cowls. Screws should be inspected along center bottom and directly behind spinner. Two screws behind the spinner will be removed to de-cowl or to add/remove winterization kits. It is imperative that these screws not be overlooked during pre-flight as severe cowl damage will result if engine is started without them in place.

d. Cabin Air Vent.. Unobstructed

Visually inspect air vent for debris or obstructions which could prevent fresh air flow to the cabin.

e. Exhaust Pipe .... Condition, Security and Clearance

SR20/SR22[(T),(TN),(G5)]- Ensure there is adequate clearance between lower cowling and exhaust pipes and verify they are secure with some movement. Inspect heat shield for security.

SR22TN/SR22T - Ensure each tailpipe is secure by grasping the end of the tailpipe. Loose tailpipes should be serviced prior to flight. Do not fly an aircraft with loose tailpipes.

f. Gascolator (underside) .... Drain for 3 Seconds, Sample

Use clear fuel strainer and drain for 3 seconds. Inspect fuel sample for contaminants and proper color. Ensure drain does not leak after taking sample.

9. Nose Gear, Propeller and Spinner

a. Tow Bar .... Remove and Stow

b. Strut .... Condition

Inspect strut and fairing for condition and security.

c. Wheel Fairing .... Security, Accumulation of Debris

Ensure fairing is not damaged and is attached securely.

d. Wheel and Tire .... Condition, Inflation and Wear

e. Propeller .... Condition, Check Ground Clearance

Inspect the propeller blades for smoothness and ensure there are no significant nicks in the blades. Check for any damage to the tips of each blade.

SR22T or equipped - Verify oleo strut is properly inflated by checking ground clearance of the propeller. Clearance should be approximately 9 inches from blade tip to ground.

f. Spinner .... Condition, Security, and Oil Leaks

Ensure spinner screws are secure, check for any oil on spinner, propeller blades or cowling.

g. Air Inlets .... Unobstructed

Verify air inlets are free of obstructions and ensure cowling screws are secured. If winterization kits are installed, check for security of the kit and screws.

h. Alternator .... Condition

SR20 - Physically verify security of alternator, electrical connections and belt.

SR22/SR22TN/SR22T - Physically verify security of alternator and electrical connections.

10. Nose Left Side

a. Landing Light .... Condition

Verify landing light is intact and cover is secure with no cracks.

b. Engine Oil .... Check 6-8 quarts

Visually verify oil quantity, ensure oil cap is tightly secured and both latches on the oil door are locked.

When opening oil door, do not let latches snap back against oil door as this may lead to paint chipping and cracking.

c. Cowling .... Attachment Secure

Visually inspect each cam lock for secure fitting along top and side of cowls. Screws should be inspected along center bottom and directly behind spinner.

d. External Power .... Door Secure

Ensure cam lock is secured. Phillips head screw driver may be required to secure.

e. Ice-inspection Light (FIKI) .... Condition/Security

Inspect for security of light and lighting cover. Ice lights are required for night operations in icing conditions.

f. Windshield Spray Nozzles (FIKI) .... Condition/Security

Ensure nozzles are securely fitted to the cowling and are unobstructed.

g. Vortex Generator .... Condition

Inspect condition of vortex generator and ensure it has not been damaged.

h. Exhaust Pipes .... Condition, Security and Clearance

SR20/SR22 - Ensure there is adequate clearance between lower cowling and exhaust pipes and verify they are secure with some movement. Inspect heat shield for security.

SR22TN/SR22T - Ensure each tailpipe is secure by grasping the end of the tailpipe. Loose tailpipes should be serviced prior to flight. Do not fly an aircraft with loose tailpipes.

11. Left Main Gear and Forward Wing

a. Wheel Fairings...................... Security, Accumulation of Debris

Physically ensure security of wheel pants. Check for debris in wheel pants (ice or slush may have formed during taxi).

b. Tire .... Condition, Inflation and Wear

Inspect tire for excessive wear to include flat spots, bald spots or visible tire chords. Ensure adequate tire inflation. Moving the aircraft may be necessary to visually inspect the entire tire for overall condition if excessive wear is suspected.

c. Wheels and Brakes..Condition

Inspect the area directly surrounding the wheel for evidence of fluid leaks. Visually inspect brake temperature sticker for evidence of overheating. (Center of blue inspection disc is white in a normal condition, dark gray when overheated.)

d. Chock and Tie Down Ropes .... Remove

Ensure all wheel chocks and tie down ropes are removed and stowed securely to prevent hazards to others.

e. Fuel Drains (2 underside) .... Drain and Sample

Use a clear fuel strainer and sample fuel from the main tank and the collector tank. Visually verify color for grade of fuel and inspect for contaminants. Ensure fuel drains do not leak after taking sample.

f. TKS Fluid Vent (underside wing) (FIKI) .... Unobstructed

Verify there are no obstructions to the TKS fluid vent.

g. TKS Fluid Reservoir (FIKI) .... Verify Desired Quantity

Check cap condition and security. Minimum dispatch level for flight into known ice is 5 gallons between the two tanks. Use only approved fluid meeting DTD-406B standards.

h. Fuel Cap ....Check Quantity and Secure

Visually verify fuel is at desired amount and that the fuel cap is secured and locking tab is facing rearward.

i. Leading Edge and Stall Strips ....Condition

Inspect leading edge for any abnormalities. Ensure both stall strips are secured.

12. Left Wing Tip

a. Fuel Vent (underside) .... Unobstructed

Verify there are no obstructions to the fuel vent.

b. Pitot Mast (underside) .... Inspect

Ensure cover removed and stowed, inspect tube inside and out for any obstructions. Pitot mast may be hot.

c. Strobe, Nav Light and Lens ....Condition and Security

Inspect for security of lighting covers.

d. Tip ....Attachment

Ensure all screws are in place on upper and lower surfaces. Visually inspect for and damage to leading edge, trailing edge and wing tip.

13. Left Wing Trailing Edge

a. Aileron .... Freedom of Movement

Verify full deflection of right aileron and ensure opposite deflection of left aileron. Inspect control assemblies located near the leading edge of outboard and inboard aileron. Inspect the security of the bolt located under the inboard edge of the aileron.

b. Aileron Gap Seal .... Security

Visually inspect the aileron gap seal attachment along the entire surface.

c. Flap and Rub Strip ....Condition and Security

Inspect flap hinges, bolts, and cotter pins for security and verify a small amount of movement when flaps are in an extended position. Visually inspect rub strip for abnormal chafing.

d. Hinges, Actuation Arm, Bolts and Cotter Pins...............Secure

Verify all moveable control surfaces are secure and all bolts and cotter pins are in place.

Ice Protection System Pre-Flight Inspection

The ice protection system should be tested following the normal pre-flight inspection. An inspection of the ice protection system including verification of proper mode selection and adequate fluid flow is required any time use of the system may be necessary during flight.

FIKI - Dispatch into known icing conditions is prohibited if porous panels do not fully “wet-out” or persistent annunciation of any anti-ice system CAS messages.

System priming is only necessary if planning to enter forecast icing conditions or IMC and OAT is less than 41°F / 5°C.

• Note •

The following procedure is designed to be performed immediately following the normal pre-flight inspection. Items normally checked during that inspection will not be repeated here. Reference the AFM supplement for a complete, stand-alone checklist.

Prior to conducting a pre-flight inspection of the ice protection system, ensure the aircraft is positioned in an area in which dripping anti-ice fluid will not cause a slipping hazard to other persons. Pilots should not operate the anti-ice system in high-traffic areas or inside hangars.

During long periods of non-use, the porous panel membranes may dry out which can cause uneven fluid flow during subsequent operation. Perform the pre-flight inspection every 30 days to keep porous panel membranes wetted.

1. Cabin
    a. Battery 1 Master Switch .... ON
    b. Cabin Doors..Close

       Close doors in order to prevent anti-ice fluid from the windshield sprayer from entering cabin.
    c. WIND SHLD Push-Button...Press

       Verify Evidence of anti-ice fluid from spray nozzles.
    d. ICE PROTECT System Switch .... ON
    e. ICE PROTECT Mode Switch ....NORM

       Verify Metering Pump Cycle is 30s on, 90s off. Check anti-ice fluid endurance indications on the MFD.
    f. ICE PROTECT System Switch ....OFF
    g. PUMP BKUP Switch... ON

       Verify Metering Pump is continuously on. Check anti-ice fluid endurance indications on the MFD.
    h. PUMP BKUP Switch...OFF
    i. ICE PROTECT System Switch .... ON
    j. ICE PROTECT Mode Switch ....HIGH

       Verify Metering Pump is continuously on. Check anti-ice fluid endurance indications on the MFD. Pump should remain on HIGH for walk-around inspection of panels.

2. Empennage
   a. Stabilizer Porous Panels..............................Condition/Security

      Check condition and security of porous panels. Verify evidence of anti-ice fluid along length of panels.

3. Right Wing Forward and Main Gear
   a. Porous Panels ....Condition/Security

      Check condition and security of porous panels. Verify evidence of anti-ice fluid along length of panels.

4. Nose Gear, Propeller, Spinner
   a. Slinger Ring.................................... Evidence of Anti-Ice Fluid

      Verify anti-ice fluid is dripping from the bottom of the slinger ring. This will ensure ice protection to the prop.

5. Left Wing Forward and Main Gear
   a. Porous Panels ....Condition/Security

      Check condition and security of porous panels. Verify evidence of anti-ice fluid along length of panels.

6. Cabin
   a. ICE PROTECT System Switch..OFF
   b. Anti-ice Fluid Quantity ....Check

      Verify minimum 5 gallons if dispatching into icing conditions.

   c. Bat 1 and 2 Master Switches..OFF

      Ensure both battery switches are turned off.

Instructor Notes

The importance of a thorough pre-flight for each and every flight cannot be overstated. Highlight the following areas when teaching proper pre-flight inspections: fuel system and quantity, oil quantity, TKS system, flight controls, and O_2 system.

Night-time pre-flight inspections are more difficult. Encourage the use of a bright, white-light flashlight. At least one good flashlight with backup batteries should always be carried onboard, accessible to the pilot.

Before Engine Start

Complete the Before Starting Engine checklist as a do-list to start the aircraft engine. Before starting the engine verify all pre-flight items are complete and all emergency equipment is on board and stored in the proper location. Consider removing the CAPS pin after all occupants have boarded the aircraft and are seated with seat belts fastened. Ensure seats are locked into position by verifying the control handle is in the full down position.

During engine start, the aircraft should be positioned so that the propeller blast will not adversely affect any aircraft, hangar, or person.

Passenger Flight Briefing

The pilot should provide a safety briefing, referencing the Passenger Briefing Card, to all passengers prior to each flight. The briefing shall provide instructions in the event of a pilot incapacitation including the use of the CAPS, seat belts, exits, and any other safety equipment on the aircraft. The pilot should also discuss sterile cabin procedures and other information as necessary.

At a minimum, passengers should be briefed on the following items:

- CAPS,
- Smoking,
- Seatbelts,
- Doors,
- Emergency Exits/Egress Hammer,
- Use of Oxygen.

Procedure (Do-List)

1. Pre-flight Inspection .... COMPLETE

   Verify pre-flight inspection has been completed and all items are completed.

2. Weight and Balance .... Verify within Limits

   • WARNING •

   Ensure that the airplane is properly loaded and within the AFM's weight and balance limitations prior to takeoff.

3. Emergency Equipment..ON BOARD

Verify all safety equipment required for flight is on board and in working order. This may include, but is not limited to, personal flotation equipment, life raft, flashlight, batteries, cold weather equipment, etc.

4. Passengers .... BRIEFED

   Ensure all passengers have been briefed according to the Cirrus Aircraft Passenger Briefing Card and verify a briefing card is located in each seat back. See passenger briefing items listed in previous section. Verify CAPS pin is removed.

5. Seats, Seatbelts and Harnesses .... ADJUST AND SECURE

   Verify all seats, including seat backs and slides are locked, and belts and harnesses are securely adjusted and fastened for all occupants of the aircraft.

• Caution •

Crew seats must be locked in position and control handles fully down before flight. Ensure seat belt harnesses are not twisted.

Instructor Notes

Have the Cirrus pilot provide a passenger briefing during the training course. Ensure he or she covers all necessary topics with emphasis on the proper procedures for activating the parachute system during a pilot incapacitation scenario.

At a minimum, pilots should be able to teach their non-pilot passengers to:

- Engage the level button on the autopilot,
- Attempt to revive the pilot,
- Follow the parachute deployment procedures detailed on the CAPS placard, and
- Prepare for CAPS touchdown.

Pilots should also be able to explain and demonstrate proper door operations to their passengers. Teach pilots to close the passenger door from the outside when flying with infrequent flyers.

The use of supplementary oxygen for non-pilot passengers during high altitude operations may be foreign or uncomfortable. Ensure the pilot is able to explain and demonstrate the proper use of masks, cannulas, and flow regulators. The frequent use of a pulse oximeter is highly encouraged. Teach pilots to actively monitor the physical state of all passengers during high altitude flight looking for signs of hypoxia.

Doors may remain open for all ground operations for additional cabin airflow. Ensure pilots are able to control the aircraft on the ground while preventing the door from being stressed by wind, or propeller and jet-wash.

Loading the aircraft within weight and balance limitations is critical for safe flight. Using the aircraft's actual basic empty weight and moment, provide the pilot with multiple loading and mission scenarios. A weight and balance spreadsheet for all Cirrus aircraft is located at the Cirrus Training Portal. Ensure pilots are able to place passenger, fuel, and baggage loads properly within aircraft limitations. Flying an overweight and/or out of balance aircraft is especially egregious during flight training due to the negative behaviors being taught to easily influenced, non-professional pilots.

Engine Start

The Engine Start checklist should be accomplished as a do-list. Select the proper engine start procedure based on outside air temperature and internal engine temperature.

If the engine has been exposed to temperatures at or below 20ºF (-7ºC) for a period of two hours or more, the use of an external pre-heater and external power is highly recommended. Failure to properly pre-heat a cold soaked engine may result in congealing within the engine, oil hoses, and oil cooler with a potential loss of oil flow, possible internal damage to the engine, and subsequent engine failure.

If the engine does not start during the first few attempts, or if the engine firing diminishes in strength, the spark plugs have probably frosted over. Pre-heat must be used before another start is attempted.

Pilots may opt to power on the battery 1 and 2 and avionics switches and obtain their IFR clearance and complete flight plan programming prior to engine start if clearance and/or taxi delays are anticipated. Limit ground operations without the engine running to preserve battery power for starting the engine.

Procedure (Do-List)

1. External Power (if applicable) .... CONNECT

   If required, pilots may want to ensure power connection and brief assisting personnel on securing external power receptacle door.

   • WARNING •

   If airplane will be started using external power, keep all personnel and power unit cables well clear of the propeller rotation plane.

2. Brakes .... HOLD

   Parking brake may be used; however, constant pressure should be applied at all times using toe brakes.

3. Bat Master Switches ....ON (check volts)

   Voltage should read approximately 23-25 volts for battery starts.

4. Strobe Lights...ON

Turn strobe lights on prior to engine start to warn others of pending engine start. For night operations, pilot may instead consider the use of navigation lights to avoid distracting others.

5. Mixture .... FULL RICH

   Mixture lever should be in the full rich position for normal engine start.

6. Power Lever .... FULL FORWARD

   Power lever should be in the full forward position in order to prime the engine.

7. Fuel Pump.. PRIME, then BOOST

   On the first start of the day, especially under cool ambient conditions, holding Fuel Pump switch to PRIME for 2 seconds will improve starting.

8. Propeller Area .... CLEAR

   Visually clear the area around the propeller and ensure the area behind aircraft is clear and that no one is approaching the aircraft.

9. Power Lever .... OPEN ¼ INCH

   Open power lever and maintain one hand on power lever.

10. Ignition Switch .... START

    Hold key in Start position until positive engine start then release verifying key is in the BOTH position.

    • Caution •

    Limit cranking to intervals of 20 seconds with a 20 second cooling period between cranks. This will improve battery and contactor life.

11. Power Lever .... RETARD (to maintain 1000 RPM)

    Adjust the power lever as necessary to maintain engine smoothness and engine speed at 1000 RPM.

12. Oil Pressure .... CHECK

    • Caution •

    After starting engine, if the oil gauge does not begin to show pressure within 30 seconds in warm weather and about 60 seconds in very cool weather, shut down engine and investigate cause. Lack of oil pressure indicates loss of lubrication, which can cause severe engine damage.

13. Mixture (SR22TN/SR22T) .... LEAN

    Lean the mixture for maximum RPM rise shortly after engine start and leave the mixture lean during taxi until the run up.

    It is acceptable to lean the SR20 and SR22 using the same procedure described above for high altitude operations or if spark plug fouling is suspected.

14. Alt Master Switches .... ON

    Turn on both alternator master switches after engine start.

    • Caution •

    Alternators should be left OFF during engine start to avoid high electrical loads being placed on the alternators.

15. Avionics Power Switch .... ON

    Turn on avionics power switch and verify all avionics power up.

16. Engine Parameters .... MONITOR

    Monitor all engine parameters to include manifold pressure, engine speed, oil pressure and temperature, EGTs, and CHTs. If any system displays an abnormal indication, engine shutdown should be considered and the problem investigated.

17. External Power (if applicable) .... DISCONNECT

    Verify external power is removed and external power door secured by the assisting personnel. Consider reducing power to idle while external power is disconnected to minimize propeller blast. Carefully observe the process in case there is a need for engine shutdown.

18. Amp Meter/Indication .... CHECK

    Check the amperage output of both alternators; both alternators should indicate a positive amperage. Check voltage of both batteries. Excessively high or low readings may indicate a problem and should be investigated.

Instructor Notes

There are few things more frustrating than an engine that fails to start. This is typically a result of the pilot selecting the incorrect procedure. Pilots should demonstrate proficiency in hot, cold, and flooded engine starts during Cirrus courses.

The proper engine start procedure is dependent on multiple factors, including internal engine temperatures, outside air temperatures, available battery power, and dry or flooded cylinders. Below is some basic guidance to use when teaching pilots proper engine start procedures.

The term ‘cold start’ refers to the internal temperature of the engine, not the outside air temperature. Use the cold start procedure when the internal temperature of the engine is at or close to ambient temperatures, or if the engine has not been run for some time. Left-over fuel in cylinders will eventually drain over time. Additional fuel, through priming, will be required for a successful engine start.

The term ‘hot start’ refers to the internal temperature of the engine, not the ambient air temperature. Use the hot start procedure when the internal temperature of the engine is above the outside air temperature due to recent operation. Priming is usually not required for a hot start due to left-over fuel in cylinders and may result in excess fuel or a flooded engine. Opening the throttle more than required for a cold start assists in hot starts. The throttle must be reduced shortly after the engine fires to maintain RPMs at 1000 after engine start.

Ensure pilots are able to recognize symptoms of vapor lock and respond accordingly. A sign of vapor lock could be recognized as a lack-of or intermittent fuel flow during prime with a hot engine and high outside air temperatures.

Teach pilots to recognize the symptoms of a flooded engine when opportunities arise. Ensure they are able to manage the throttle and mixture controls appropriately.

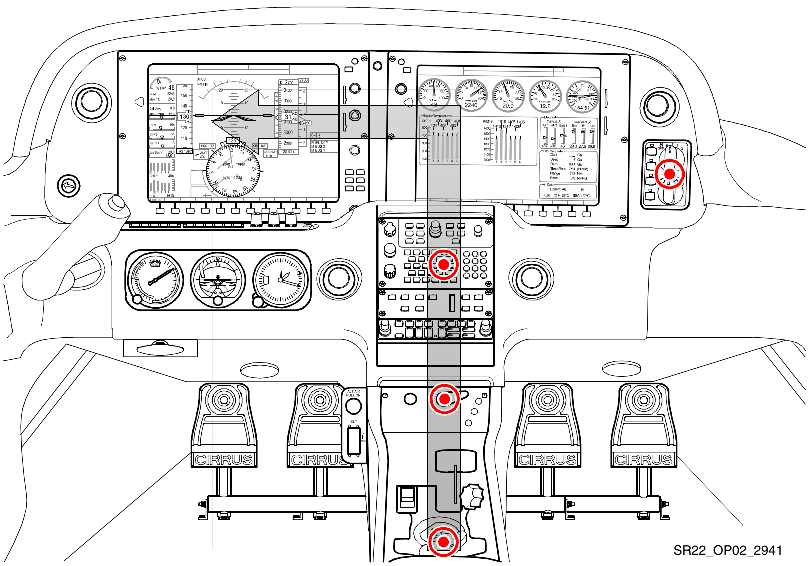
Common Errors

- Inadequate pre-heating during cold weather operations,
- Selection of the wrong starting technique,
- Over or under priming. Pilots are encouraged to monitor fuel flow during priming,
- Throttle mismanagement after engine start resulting in excessive RPMs,
- Fails to monitor oil pressure shortly after engine start,
- Fails to complete remaining engine start checklist items after the engine is started.

Before Taxi

Complete the Before Taxi checklist as a flow and then reference the aircraft checklist to verify all items are complete. It is recommended to program the required navigation information and communication frequencies for the intended flight at this time. Navigation information should be entered into the flight plan via the Garmin Control Unit (GCU). Set primary airborne frequencies into COM 1 and necessary ground frequencies into COM 2. Set applicable VOR frequencies if necessary at this time.

Obtain airport weather information and call for taxi and or IFR clearance if applicable. Verify the waypoints entered into the flight plan match the IFR clearance obtained including applicable departure procedures.



Before Taxi Flow

Procedure (Flow Pattern)

1. Flaps .... UP (0%)

   Visually verify flaps are in the 0% position and flap position light UP is illuminated.

2. Radios/Avionics .... AS REQUIRED

Ensure all radios and avionics are programmed, navigation frequencies identified, courses set and with required waypoints or flight plans loaded.

3. Cabin Heat/Defrost .... AS REQUIRED
4. Fuel Selector..SWITCH TANK

   Switch tank to ensure positive fuel flow from both fuel tanks.

Avionics Configuration

- Audio Panel....................................Select COM AS REQUIRED

  Ensure desired communication are selected. Adjust intercom volume as required.

- Autopilot ....Verify OFF

  Verify the autopilot is not engaged and yaw damper is off.

- GCU/MFD/PFD.................. SET COM and FPL AS REQUIRED

  Initialize the MFD and verify database currency. Construct flight plan as required and set applicable communication and navigation frequencies.

- MFD .... CONFIGURE

  Adjust MAP page range to display Safe Taxi. Select Chartview to view the airport diagram if Safetaxi in not available for the airport.

- PFD...VERIFY and SET

  Verify PFD is fully aligned and select the traffic display on PFD inset display.

Instructor Notes

The checklist item ‘Radios/Avionics’ should prompt the pilot to set up all communication frequencies and flight plan for departure. It is very common for pilots to check off this item quickly and not perform any radio or avionics related tasks.

For IFR departures, encourage pilots to obtain their IFR clearance separately, and before obtaining a taxi clearance. This will ensure there is adequate time to program navigation and communication information before taxi.

There are multiple ways to set and control communication frequencies, including PFD controls, GCU controls, and auto-fill features. The most basic and intuitive control is the dedicated communication controls located on the PFD bezel. Pilots new to the Perspective avionics will quickly learn to use these controls. Encourage pilots to use the GCU and auto-fill communication controls only after the pilot is comfortable with the GCU and the dual concentric knob.

As a general rule of thumb, communication frequencies for departure should be organized in the following order:

- Com 1- Tower and Departure
- Com 2- ATIS, Ground, Clearance Delivery

Pilots are encouraged to always input navigation waypoints into the flight plan even for basic VFR flights. Doing so will allow the pilot to take advantage of VNAV functionality and will allow for easier course changes if necessary enroute. VFR pilots who are familiar with the flight planning controls and indications will adapt to IFR training and flying more quickly. Also, using the flight plan feature instead of direct-to navigation allows for a quick change in navigation if a return to the departure airport is necessary.

Common Errors

- Neglects to setup communication and navigation information before taxi. Programming errors or delays typically occur when these tasks are completed at the end of the runway before takeoff,
- Fails to switch fuel tanks,
- Fails to reference the electronic checklist,
- Fails to deselect a monitored frequency on the audio panel after obtaining the necessary information, typically ATIS/AWOS.

Taxi-Out

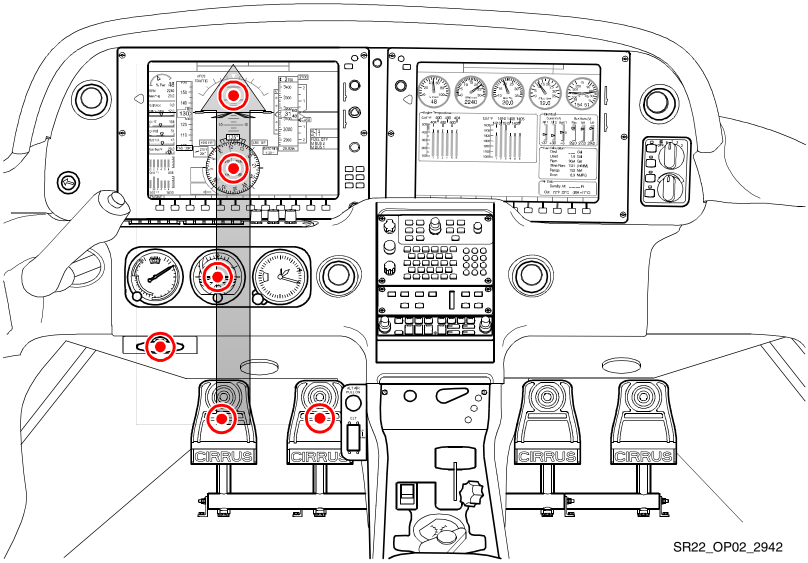
A cause of brake failure is the creation of excessive heat through improper braking practices. Riding the brakes while taxiing causes a continuous build up of energy which may lead to excessive heat. Excessive heat causes warped brake rotors, damaged or glazed linings, damaged o-rings, and vaporized brake fluid. To avoid brake failure, observe the following operating and maintenance practices:

- Directional control should be maintained with rudder deflection supplemented with brake pressure as required,
- Use only as much power (throttle) as is necessary to achieve forward movement. 1000 RPM is enough to maintain forward movement under normal conditions,
- Avoid unnecessary high speed taxiing. High speed taxiing will result in excessive demands on the brakes, increased brake wear, and the possibility of brake failure,
- Use the minimum necessary brake application to achieve directional control,
- Do not ride the brakes. Pilots should consciously remove pressure from the brakes while taxiing. Failure to do so results in excessive heat, premature brake wear, and increased possibility of brake failure,
- Refer to the Handling, Service and Maintenance section of the POH or the Maintenance manual for recommended maintenance and inspection intervals for brakes.

Maintain high levels of situational awareness during all movement on the airport surface to avoid a runway incursion accident. Minimize tasks such as reading checklists or folding maps while taxiing. Utilize the Safe Taxi airport diagram to aid in situational awareness.

• WARNING •

Maximum continuous engine speed for taxiing is 1000 RPM on flat, smooth, hard surfaces. Power settings slightly above 1000 RPM are permissible to start motion, for turf, soft surfaces, and on inclines. Use minimum power to maintain taxi speed.



Taxi-Out Flow

Procedure (Flow Pattern)

1. Parking Brake .... DISENGAGE

   Manually depress parking brake and ensure completely down.

2. Brakes .... CHECK

   Upon initial movement verify both brakes are functioning by applying pressure.

3. HSI Orientation .... CHECK

   Visually check HSI alignment with magnetic compass.

4. Attitude Gyro .... CHECK

   Verify gyro is erect and horizon bars are set level.

5. Turn Coordinator .... CHECK

   During turns on the ground, verify the rate of turn indicator displays a turn in the direction of the turn and inclinometer displays a skid.

Instructor Notes

Brake fires and premature brake wear are preventable by adhering to proper braking practices. The following are indications of improper braking techniques being used by the pilot:

- Continuous power above 1000 RPMs is required for forward movement,
- Aircraft speed over the ground is too slow considering engine RPM,
- Aircraft darting or over controlling during straight taxi resulting from the aircraft being steered via brakes, not rudder,
- Pilot does not reduce power to slow or stop the aircraft,
- Pilot taxis too fast which results in excess braking to stop.

The indications of a failed digital instrument in the Perspective system should be very apparent to the pilot. However, this does not reduce the importance of a proper instrument check while the aircraft is being taxied. Make sure the pilot cross references all instrumentation, including standby instruments during the taxi, especially in preparation for IFR flight.

Ensure pilots develop a habit of setting and cross referencing the standby altimeter whenever the barometric pressure is set on the PFD.

Common Errors

- Improper braking technique resulting in premature wear and possible fire,
- Fails to set and check all instrumentation during taxi or when the aircraft is moving and turning on the ground,
- Fails to reference the taxiing checklist,
- Fails to reference Safe Taxi for situational awareness during ground operations.

Before Takeoff

Complete the Before Takeoff checklist as a do-list. Complete the checklist at an appropriate run up area prior to departure. The Before Takeoff checklist will ensure the aircraft is properly configured for takeoff and all engine and electrical indications are within parameters. Run-up items are included in this checklist. Verify engine oil temperature reaches a minimum of 100° F prior to applying run up power settings. Verify all engine and electrical indications are normal prior to departure.

During cold weather operations, the engine should be properly warmed before takeoff. In most cases this is accomplished when the oil temperature has reached at least 100° F. In warm or hot weather, precautions should be taken to avoid overheating during prolonged ground engine operation. Additionally, long periods of idling may cause fouled spark plugs.

Procedure (Do-List)

1. Doors ....LATCHED

   Verify both top and bottom latch of each door is securely latched. Press firmly at each door latch position to determine the security of each door.

2. CAPS Handle..Verify Pin REMOVED

   Verify the CAPS pin is removed and stowed. Ensure cover placard is securely fastened.

3. Seat Belts and Shoulder Harness.................................... SECURE

   Verify the security and placement of all seat belts and shoulder harnesses of each occupant. Also, verify all occupants are properly informed of seat belt requirements and operation.

4. Fuel Quantity .... CONFIRM

   Confirm the fuel quantity is sufficient for the planned flight and fuel tank quantities are balanced.

5. Fuel Selector.. FULLEST TANK

   Ensure the fuel selector is drawing fuel from the fullest tank.

6. Fuel Pump .... AS REQUIRED

   SR20/SR22 - Fuel Pump On

   SR22TN/SR22T - Fuel Pump Low Boost

7. Mixture .... AS REQUIRED

   SR22 - Set the mixture full rich for sea level departures. Set mixture control lever for maximum power on takeoff for altitudes higher then sea level. Reference the Max Power Fuel Flow placard or the top of the green arc of the fuel flow gauge for proper mixture setting. Power must be at full-throttle for placarded values to be accurate.

   SR20/SR22TN/SR22T - Set the mixture full rich for all altitudes.

8. Flaps .... SET 50% & CHECK

   Select flaps to 50% and visually verify both flaps are in position prior to takeoff.

9. Transponder .... SET

   Set assigned squawk code if one is given, otherwise, set the appropriate code.

10. Autopilot .... CHECK

    Complete the autopilot test in accordance with the autopilot user guide.

11. Navigation Radios/GPS .... Set for Takeoff

    Verify radio frequencies are set to include tower/departure frequencies. Check GPS flight plan for accuracy and correct initial waypoint.

12. Cabin Heat/Defrost .... AS REQUIRED

    Set environmental controls as desired prior to takeoff.

13. Brakes .... HOLD

    Firmly hold brakes. Set the parking brake if assistance is required.

14. Power Lever .... 1700 RPM

    Increase power lever to 1700 RPM for engine run-up. Ensure oil temperature is at least 100º F prior to increasing power. Select the engine page for expanded engine and electrical information during the engine run-up.

15. Alternator .... CHECK

    Alternator will be checked by placing greater electrical loads and turning on additional equipment below.

    a. Pitot Heat .... ON
    b. Navigation Lights .... ON

c. Landing Light .... ON

d. Annunciator Lights .... Verify OFF

Verify that no electrical CAS messages appear on the PFD and that positive amps are indicated.

16. Voltage .... CHECK

Verify voltage outputs for both main buses and the essential bus are in the green arcs.

17. Pitot Heat .... AS REQUIRED

Pitot heat should be turned ON for flight into IMC, flight into visible moisture, or whenever ambient temperatures are 5° C or less to reduce the possibility of pitot tube icing.

18. Navigation Lights .... AS REQUIRED

Select navigation lights ON for night operations.

19. Landing Light .... AS REQUIRED

Select landing light ON. It is recommended to leave the landing light on while within 10NM of the departure airport.

20. Magnetos .... CHECK LEFT and RIGHT

a. Ignition Switch .... R, note RPM, then BOTH

b. Ignition Switch .... L, note RPM, then BOTH

RPM drop must not exceed 150 RPM for either magneto. RPM differential must not exceed 75 RPM between magnetos. If there is a doubt concerning operation of the ignition system, RPM checks at higher engine speeds will usually confirm whether a deficiency exists. An absence of RPM drop may indicate faulty grounding of one side of the ignition system or magneto timing set in advance of the specified setting.

21. Engine Parameters .... CHECK

Visually verify all engine parameters are in acceptable ranges. Check Oil pressure and temperature, RPM, manifold pressure, EGT and CHT.

22. Power Lever .... 1000 RPM

23. Flight Instruments, HSI and Altimeter .... CHECK and SET

Set all flight instruments for initial course and altitude. Verify the HSI displays proper course and heading when checked with magnetic compass. Ensure local altimeter has been set and is within 75 feet of field elevation.

24. Flight Controls .... FREE & CORRECT

    Check for full range of motion of the control yoke and that control surface deflection corresponds to yoke deflection.

25. Trim .... SET for Takeoff

    Set electric trim in the takeoff position as displayed on control yoke arm.

26. Autopilot .... DISCONNECT

    Ensure PFD heading and altitude bugs are set and the autopilot is disconnected.

    GFC 700 - Press the go-around button on the throttle to engage the Flight Director in Takeoff (TO) mode. Set the HDG and ALT bug for the assigned initial heading and altitude.

Icing Conditions Anticipated after Takeoff (FIKI):

1. ICE PROTECT System Switch.. ON
2. ICE PROTECT Mode Switch.....................................NORM/HIGH

   HIGH should be selected initially to ensure critical lifting surfaces remain clear of ice during takeoff and initial climb. Once in enroute climb and ice buildup on unprotected surfaces is negligible, the pilot may select NORM. If rate of ice buildup on protected surfaces is unacceptable, select HIGH or MAX as appropriate.

3. PITOT HEAT Switch .... ON
4. Cabin Heat .... Hot
5. Windshield Defrost .... ON

   Hot windshield defrost should be used to reduce the possibility of ice forming on the windshield.

6. Ice-Inspection Lights .... As Required

   Ice inspection lights will illuminate the leading edges of the wings and horizontal stabilizer in order to monitor ice accumulation and confirm fluid flow at night.

Instructor Notes

When possible, the Before Takeoff checklist should be completed at the end of the runway or in a designated run-up area. Checklist items that are intentionally not completed due to further taxiing requirements or extended run-up periods on the ground should not be checked off in the electronic checklist until they are actually completed before takeoff. For example, a pilot may elect to leave the flaps at 0% for further taxi over contaminated surfaces. Reference the checklist at the end of the runway to ensure all remaining controls are properly set for takeoff.

The run-up items in the Before Takeoff checklist should be completed as a flow with the engine monitoring page displayed on the MFD. This allows the pilot to see more detailed engine and electrical information. Return to the checklist page to verify all items are completed. In addition to completing the Before Takeoff checklist in its entirety, it is also recommended to teach a quick pre-takeoff checklist flow to be accomplished immediately before the departure roll. A quick sweep through the cockpit to re-check the boost pump setting, mixture setting, flap setting, lights, pitot heat, and trim is a good habit to develop.

Encourage pilots to set the flight director command bars in the takeoff mode for initial climb reference and for reduction of autopilot programming errors. Regardless of the time of year, pilots transitioning into a Cirrus aircraft equipped with the FIKI system should be presented with a departure into known icing conditions scenario. Ensure pilots follow the procedure detailed in the checklist and confirm flow coverage over the protected surfaces. Verify that pilots also turn on the pitot heat prior to departure and abide by pitot heat ground limitations.

Encourage pilots to monitor CTAF or tower frequency at the end of the runway to develop a mental picture of traffic in the local area.

Common Errors

- Fails to complete checklist items in their entirety,
- Intentionally skips items in the checklist but neglects to re-reference the checklist and complete the task before departure,
- Fails to adhere to FIKI pitot heat ground operating limitations,
- Fails to recognize an unlatched pilot or passenger door during the engine run-up.

Takeoff Briefing

Reference the Takeoff checklist prior to departure. Complete a takeoff briefing to review the critical items prior to takeoff. A takeoff briefing allows the pilot to review the takeoff procedure and determine the actions necessary in the event of abnormal/emergency conditions during the takeoff roll and initial climb. At a minimum, a takeoff briefing should include the following items:

- Type of procedure used (normal, short, or soft),
- Takeoff distance required / runway distance available,
- V_R and initial climb speed,
- Abnormality / engine failure before V_R,
- Abnormality / engine failure after V_R,
- CAPS strategy in the event of a loss of power during climbout considering altitude.

Sample Takeoff Briefing

This will be a __________ (normal, short, soft) takeoff from runway _________ with a takeoff distance of _______ feet and ________ feet of runway available. Rotation speed is ______ KIAS. Initial heading after takeoff is _______ degrees to an altitude of _______ feet. Abort the takeoff for any engine failures/abnormalities prior to rotation. If the engine fails after rotation I will ______________(determine if CAPS is an option).

CAPS Takeoff Recommendation

Follow these recommendations in the event of a total loss of engine power during the initial climb out considering the aircraft's altitude.

Height Above Ground Level (AGL)	Recommended Response
0' - 500', (0' - 600' G5)	Land straight ahead[a]
500' - 2000', (600' - 2000' G5)	CAPS immediately
2000' or greater	Troubleshoot, use CAPS as required

a. Activate CAPS immediately if no other survivable alternative exists.

Normal Takeoff

Use of the Flight Director in Takeoff (TO) mode is recommended if using the GFC 700 autopilot. Press the Go-around button on the throttle to engage the Flight Director in TO mode. The recommended flap setting for a normal takeoff is 50%. Align the aircraft on the runway centerline and smoothly apply full power in a 4 to 5 second continuous sweep. Slight brake pressure may be required for directional control early in the takeoff roll in some crosswind situations. Maintain directional control with rudder during the takeoff roll after sufficient rudder control is available. Check engine and airspeed indications early in the takeoff roll to ensure proper function. Discontinue the takeoff by reducing the power to idle and using brakes as necessary for any abnormal engine or airspeed indications, sluggish acceleration, or rough engine. At V_R smoothly apply back pressure to the control yoke sufficiently enough to rotate the aircraft. Pitch the aircraft for approximately 7° to intercept V_X or V_Y as appropriate. Maintain coordination with proper rudder input during the climb out.

Procedure (Flow Pattern)

1. Brakes.. RELEASE (Steer with Rudder)

   Initially, a slight amount of differential braking may be required for directional control. As airspeed increases, both feet should be removed from toe brakes and directional control maintained with rudder inputs.

2. Power Lever .... FULL FORWARD

   Smoothly increase power lever full forward for maximum takeoff power. Discontinue takeoff if any rough or sluggish acceleration is noted. Do not confuse any detents for a full power setting. Engine speed at full power should be approximately:

   - SR20/SR22/SR22TN - 2700 RPM,
   - SR22T - 2500 RPM.

   SR22TN/SR22T - During the first takeoff of the day, due to relatively low engine oil temperature, engine Manifold Pressure may exceed limits. This is acceptable, but if this occurs, pilots should smoothly reduce power slightly to bring MP back below red-line. As a technique, pilots can smoothly add power on takeoff until reaching red line, instead of full-forward. Verify that the power lever can be moved to full forward and remain within limits.

3. Engine Parameters .... CHECK

   Monitor engine parameters during the takeoff roll. If any abnormal or questionable indications arise, abort the takeoff early in the takeoff roll.

4. Elevator Control .... ROTATE Smoothly at V_R

   As airspeed approaches V_R, smoothly and gradually apply back pressure to the control yoke to increase the angle of attack sufficiently enough to rotate the aircraft.

   - SR20 - 65 to 70 KIAS
   - SR22 - 70 to 73 KIAS
   - SR22 G5 - 73 to 76 KIAS
   - SR22T G5 - 77 to 83 KIAS

5. Flaps .... UP

   Retract the flaps after the following conditions have been met. Slight back pressure may be required after flap retraction

   - SR20 - 85 KIAS,
   - SR22 - 80 KIAS,
   - SR22 G5 - 90 KIAS,
   - Positive rate of climb,
   - Clear of terrain and obstacles.
   - FIKI - Retract as soon as practical once conditions are met.

Instructor Notes

Pilots learning to fly an SR22 after flying a lower-powered aircraft are typically caught off guard by the amount of acceleration, left turning tendencies, and climb rates. Pilots may have difficulty early in the takeoff roll when switching from steering with brakes to steering with rudder controls. Follow these recommendations for addressing these pilot issues.

- Thoroughly describe the takeoff experience and desired control inputs, including magnitude of control inputs,
- Use a wide runway, 75 feet or greater, for initial takeoff practice to increase safety margins. Eventually, practice on a narrower runway,
- Avoid rolling takeoffs,

- Ensure the pilot is focusing his or her vision at the opposite end of the runway to help identify small deviations sooner,
- Instruct the pilot to add power at half the rate of normal power addition (8-10 seconds from 0 to 100%). Ensure adequate runway is available for this procedure,
- Instruct the pilot to add 50% power while holding brakes, check gauges, then release brakes and steer with rudder only. This helps pilots make the transition from brake steering to rudder steering,
- Ensure the pilot can quickly scan airspeed during the takeoff roll and verify that the majority of his or her time is spent looking outside the aircraft.

Based upon the experience level of the pilot and proficiency observed during taxi, it may be beneficial for the instructor to demonstrate the first takeoff. Have the pilot follow along with the controls. Emphasize proper control inputs for rotation, proper rudder inputs, and deck angle for initial climb.

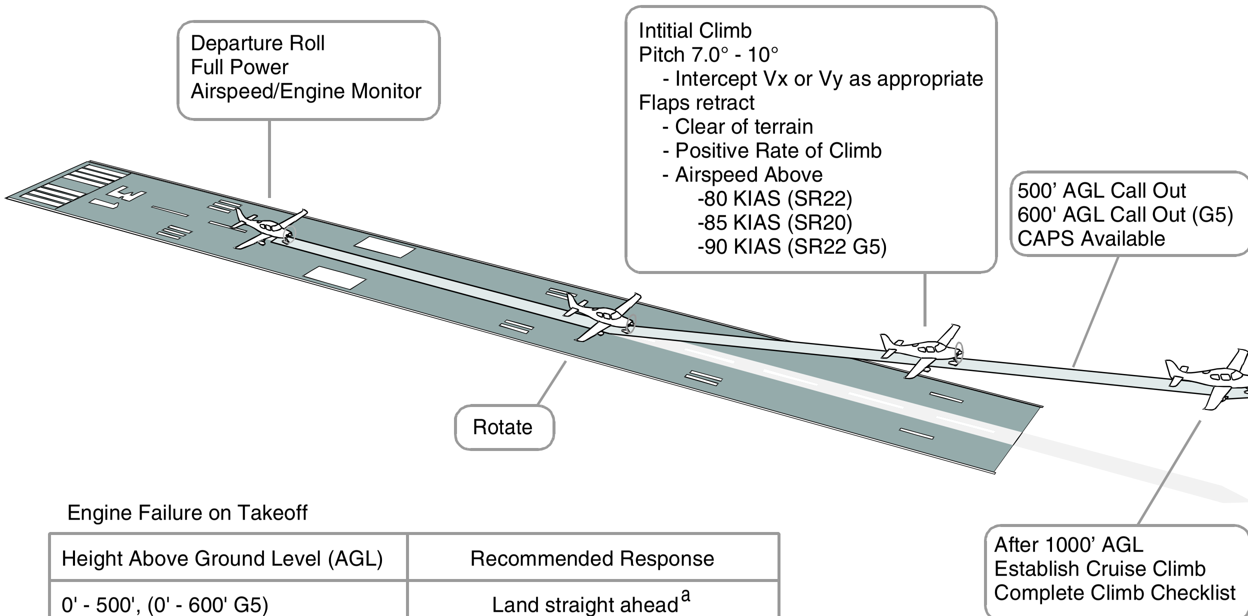
Completion Standards

- Verifies sufficient runway length is available for departure,
- For IFR flights, becomes familiar with and follows departure procedure guidance,
- Selects and executes the proper takeoff procedure with the appropriate configuration,
- Briefs the takeoff as recommended in this section with emphasis on developing a plan to handle abnormalities before or after rotation including CAPS procedures,
- Adds power smoothly to full power (4 to 5 seconds from 0 - 100%) and verbally verifies engine indications, CAS messages, and airspeed are normal early in takeoff roll,
- Aborts the takeoff early in the takeoff roll and applies brakes as necessary for engine parameter exceedences, CAS messages, airspeed issues, or other safety of flight issues,
- Keeps the runway center line between the main landing gear wheels through takeoff roll, rotation, and initial climb,
- Rotates smoothly at the recommended rotation speed to a climb attitude that will intercept V_X or V_Y as desired,

- Retracts flaps as recommended and continues to pitch the aircraft for the recommended climb airspeed,
- Does not engage the autopilot before 400 feet AGL,
- Vebally announces “CAPS Available” at 500 feet AGL,
- Maintains runway alignment until 1/2 mile past the departure end of the runway unless otherwise directed by ATC.

Common Errors

- Loses directional control due to inadequate rudder inputs,
- Fails to recognize an unlatched or improperly closed door,
- Fails to promptly add full power early in the takeoff roll,
- Over rotates and uses poor airspeed control during the initial climb,
- Fails to track over the extended runway centerline during initial climb,
- Uses brakes excessively during the takeoff roll,
- Fails to recognize an unsafe situation early in the takeoff roll and fails to abort the takeoff promptly.



Engine Failure on Takeoff

Height Above Ground Level (AGL)	Recommended Response
0' - 500', (0' - 600' G5)	Land straight ahead[a]
500' - 2000', (600' - 2000' G5)	CAPS immediatley
2000' or greater	Troubleshoot, use CAPS as required

a. Activate CAPS immediatley if no other survivable alternative exists.

SR22_OP02_2662A

Figure 3-1
Takeoff Profile

Short-Field Takeoff

Use the short-field technique to maximize takeoff performance and minimize takeoff ground roll. Set Flaps to 50% for a short-field takeoff. Align the aircraft on the runway centerline as close as possible to the end of the runway. Apply sufficient brake pressure and smoothly apply full power. Check engine indications and ensure full power before releasing the brakes. Steer with rudder only in order to minimize the ground roll distance. Rotate the aircraft at V_R smoothly and pitch for the obstacle clearance speed if an obstacle is present. Pitch for V_Y after clearing obstacles.

1. Flaps 50%

   Set flaps to 50% and visually verify both flaps are in position prior to takeoff.

2. Brakes .... HOLD

   Hold brakes firmly, do not allow the aircraft to roll.

3. Power Lever .... FULL FORWARD

   Smoothly increase power lever full forward for maximum takeoff power. Discontinue takeoff if any rough or sluggish acceleration is noted. Do not confuse any detents for a full power setting. Engine speed at full power should be approximately:

   - SR20/SR22/SR22TN - 2700 RPM,
   - SR22T - 2500 RPM.

4. Mixture .... SET

   SR22 - Set the mixture full rich for sea-level departures. Set mixture control lever for maximum power on takeoff for altitudes higher then sea level. Reference the Max Power Fuel Flow placard or the top of the green arc of the fuel flow gauge for proper mixture setting. Power must be at full-throttle for placarded values to be accurate.

   SR20/SR22TN/SR22T - Set the mixture to full rich for all altitudes.

5. Engine Parameters .... CHECK

   Check all engine parameters prior to releasing the brakes. If any abnormal or questionable indications arise, consider aborting takeoff.

6. Brakes .... RELEASE

Release the brakes and steer with rudder only. Sufficient rudder control should be available with full power.

7. Elevator Control .... ROTATE Smoothly at V_R

   As airspeed approaches V_R, smoothly and gradually apply back pressure to the control yoke to increase the angle of attack sufficient for rotation.

   - SR20 - 65 KIAS
   - SR22 - 70 KIAS
   - SR22 G5 - 73 KIAS
   - SR22T G5 - 77 KIAS

8. Airspeed at Obstacle .... Obstacle Clearance Speed

   Maintain the obstacle clearance speed with flaps at 50% until safely clear of all obstacles.

   - SR20 - 77 KIAS
   - SR22 - 78 KIAS
   - SR22 G5 - 84 KIAS
   - SR22T G5 - 85 KIAS

Instructor Notes

Pilots should be able to perform a normal takeoff as described in the completion standards before attempting a short-field takeoff. Use the Short-field Takeoff checklist to brief the takeoff procedure.

As always in a critical phase of flight, instructors should maintain close defensive positioning on rudder pedals, throttle, and flight controls. Watch for over rotation, excessive climb angles, stall conditions, and uncoordinated flight.

Obstacles may be simulated by requiring the pilot to climb at V_X until verbally announcing clear of obstacles. Closely monitor the pilot to verify flaps are not retracted prematurely, causing an excessive sink rate.

Completion Standards

- Properly executes applicable completion standards for a normal takeoff,
- Uses maximum available runway,

- Applies full power while holding sufficient brake pressure to keep the aircraft stationary until,
- Rotates promptly at the desired airspeed to proper pitch attitude to intercept V_x or V_y as necessary,
- Maintains coordination throughout initial climb.

Common Errors

- Fails to use all available runway,
- Fails to hold sufficient brake pressure to keep the aircraft stationary during power addition,
- Over rotates the aircraft, causing a possible stall condition,
- Fails to apply adequate rudder inputs to maintain coordination,
- Prematurely retracts flaps, causing excessive sink rates.

Soft-Field Takeoff

Soft or rough field takeoffs are executed using 50% flaps. Add 20% to the takeoff ground roll distance for dry grass runways and 30% for wet grass. Ensure the quality of the runway is adequate to support the aircraft. Avoid runways with long grass, soggy soil and large ruts or holes. Higher power settings will be required to taxi on grass surfaces. Hold full back pressure on the control yoke while taxiing and during the initial takeoff roll to reduce the pressure on the nose wheel. Reduce the back pressure slightly once the nose wheel lifts off the ground. Hold the aircraft in a nose up attitude until the aircraft becomes airborne. Once airborne reduce back pressure as necessary to remain in ground effect or within 20 feet of the surface. Accelerate the aircraft to V_X (for obstacles clearance) or V_Y before climbing out of ground effect.

Instructor Notes

Occasionally, pilots flying Cirrus aircraft will have a need to fly into and out of grass or soft field airports. The soft field technique may also be used when departing a rough or contaminated runway surface.

Have the pilot demonstrate proficiency performing the soft field technique on a hard surface runway before attempting at an actual grass field.

Completion Standards

- Properly executes applicable completion standards for a normal takeoff,
- Verifies the runway condition supports safe takeoff by taxiing over the runway prior to depart,
- Holds the elevator full aft during taxi and takeoff roll when sufficient elevator authority exists,
- Holds the aircraft at a high angle (approx 5 to 7.5 degrees) when sufficient airflow is available over the elevator,
- Relaxes back pressure during the takeoff roll and does not over rotate the aircraft,
- Reduces pitch when the aircraft becomes airborne to maintain in ground effect until V_X or V_Y is reached,
- Climbs out at $V_X$or V_Y as necessary.

Common Errors

- Fails to apply sufficient back pressure during taxi or takeoff roll,
- Over rotates the aircraft during the takeoff roll or at rotation,
- Fails to apply sufficient rudder input to maintain directional control,
- Climbs out of ground effect too quickly.

Crosswind Takeoff Technique

Partially deflect the ailerons into the wind during a crosswind takeoff. Maintain directional control with proper rudder input. Allow the aircraft to accelerate to a speed slightly higher then V_R prior to rotation. Lift the aircraft off the ground slightly quicker than with a normal takeoff. Shortly after rotation, crab the aircraft into the wind to track the aircraft along the runway centerline. Maintain coordination during climb with proper rudder input.

Instructor Notes

Do not overlook the importance of performing a crosswind takeoff correctly. When planning an instructional activity, look for airports with runway configurations that have crosswind conditions for takeoff and landing practice.

Reference the Envelope of Safety for suggested maximum headwind and crosswind values based upon pilot experience. Exceeding one's capability to handle crosswinds is a common contributor to many takeoff and landing accidents.

Completion Standards

- Properly executes applicable completion standards for a normal takeoff,
- Recognizes the need for the crosswind technique,
- Applies aileron input into the crosswind and uses rudder to maintain runway alignment during the takeoff roll and rotation,
- Reduces the amount of aileron deflection as the aircraft accelerates and aileron control effectiveness increases,
- Establishes coordinated flight and a wind correction angle shortly after takeoff and tracks over the runway centerline during initial climb.

Common Errors

- Fails to identify a crosswind situation,
- Fails to apply correct aileron inputs resulting in drift or side loads on the landing gear,
- Fails to establish a wind correction angle after rotation and allows the aircraft to drift away from the runway center line,
- Fails to resume coordinated flight after rotation resulting in a cross-control situation,

Enroute Climb

Complete the Climb checklist as a flow when time and workload permit. Once clear of obstacles and terrain, normal climbs are performed flaps UP (0%) and full power at speeds 5 to 10 knots higher than best rate-of-climb speeds. These higher speeds give the best combination of performance, visibility and engine cooling. When desired and clear of obstacles, transition to cruise climb speed for increased engine cooling, visibility, and passenger comfort.

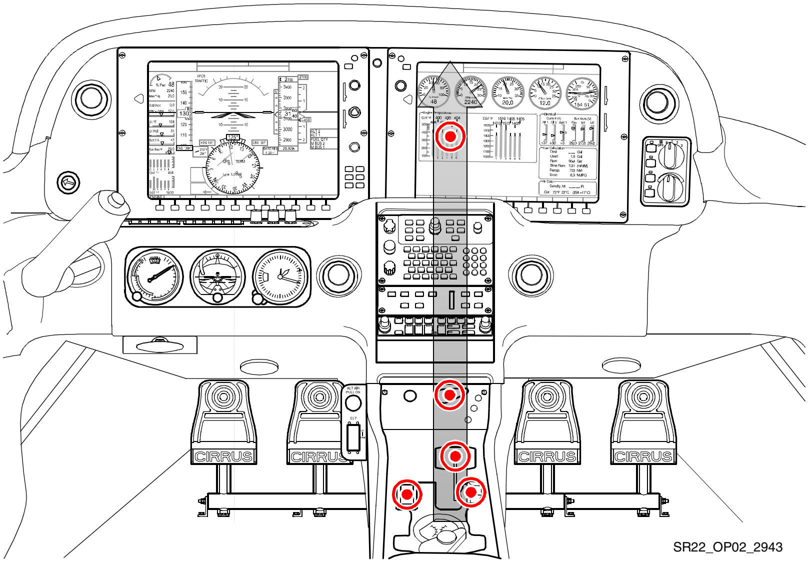
For maximum rate of climb, use the best rate-of-climb speeds shown in the rate-of-climb chart in Section 5 of the POH. If an obstruction dictates the use of a steep climb angle, the best angle-of-climb speed should be used. Climbs at speeds lower than the best rate-of-climb speed should be of short durations to avoid engine cooling problems.

For operation in noise sensitive areas when obstacle and terrain clearance is not an issue, the following procedures are recommended. Upon reaching 1000' AGL reduce power to 2500 RPM with maximum manifold pressure. Adjust pitch to maintain the desired climb airspeed. Resume full power climb upon reaching 3000' AGL and adjust mixture accordingly.

• Caution •

Use caution when engaging the autopilot at low altitude due to the increased workload of programming the autopilot and potential for human errors. Pilots should hand fly the aircraft to a safe altitude and engage the autopilot if desired when time and workload permit.

Climb Speeds (KIAS)	**SR20**	**SR22**	**SR22 G5**	**SR22TN SR22T**	**SR22T G5**
Cruise Climb	100-110	110-120	110-120	120-130	120-130
Best Rate (V_Y), Sea Level	96	101	108	101	103
Best Rate (V_Y), 10,000 ft	92	96	99	101	102
Best Angle (V_X), Sea Level	83	79	88	84	88
Best Angle (V_X), 10,000 ft	87	83	88	84	88



Enroute Climb Flow

Procedure (Flow Pattern)

1. Climb Power .... SET

   Set climb power considering noise abatement procedures. Normal climbs are made with full power.

2. Flaps .... Verify UP

   Verify flaps have been retracted to 0%. If not, verify below V_{FE} and ensure the following criteria has been met before retracting the flaps:

   - SR20 - 85 KIAS,
   - SR22 - 80 KIAS,
   - SR22 G5 - 90 KIAS,
   - Positive rate of climb,
   - Clear of terrain and obstacles.

3. Mixture .... AS REQUIRED

   Set power, mixture, and airspeed per table.

4. Fuel Pump .... As Required

   SR20 - OFF

SR22 - BOOST

SR22TN/SR22T - LOW BOOST

Fuel boost should be left on during takeoff and for climb as required for vapor suppression with hot or warm fuel.

Climb Settings		Power Lever	Mixture / Fuel Flow	Airspeed
SR20		Full Forward	Full Rich	100-110
SR22		Full Forward	Top of Green Arc	110-120
SR22TN	**Full Power Climb**	Full Forward	Full Rich	120-130
	Lean of Peak Climb	Full Forward	Cyan Target or Less	130
SR22T	**Full Power Climb**	Full Forward	Within Green Arc	120-130
	Lean of Peak Climb	30.5” MP	Cyan Target or Less	130

5. Engine Parameters .... CHECK

   Check all engine parameters for any abnormal indications that may indicate impending engine problems.

   - Fuel Flow - Monitor per Climb Settings table above
   - Cylinder Head Temperatures - Adjust fuel flow and/or airspeed to keep CHTs below:
     - SR22T - 420° F,
     - SR22TN - 380° F.

6. Oxygen.. AS REQUIRED

   a. Oxygen Masks/Cannulas... DON

   b. Oxygen System .... ON

   c. Flow Rate ....ADJUST for planned cruise altitude

   d. Flowmeters and Quantity....................................... MONITOR

   For optimal protection, pilots are encouraged to use supplemental oxygen above 10,000 feet during the day and above 5,000 feet at night.

Cannulas are not approved above 18,000 feet MSL because cannulas fail to deliver adequate levels of oxygen. Pilots must use a mask that is certified above 18,000 feet MSL when operating above FL180.

If using a pulse oximeter, adjust flow rate to keep oxygen saturation above 90%. Pilots are encouraged to use pulse oximeter and check saturation levels every 10 to 15 minutes.

Avionics Configuration

- Autopilot - Engage modes as desired above 400 feet AGL when time and workload permit,
- MFD - Complete Climb Checklist, monitor map for situational awareness,
- PFD - Monitor aircraft flight parameters and system status.

Instructor Notes

It is easy for pilots to develop an excessive reliance on the autopilot during the climb phase. Although the autopilot is a great tool for workload management and passenger comfort, it cannot take the place of good airmanship skills. Pilots must demonstrate the ability to manage the aircraft and associated systems, communication, and navigation tasks during departure.

Encourage pilots to hand-fly every other departure in an effort to maintain their hand-flying proficiency. IFR pilots experiencing high workloads, typically associated with ATC clearance changes, should use the autopilot while performing extensive avionics programming.

The IAS mode of the autopilot should be used during all climbs to maximize aircraft performance and increase safety.

It is very common for pilots new to the aircraft or avionics to focus inside the aircraft instead of outside during VMC climbs. Pilots must learn to divide their attention between cockpit tasks, instrument scan, and looking outside for collision avoidance. Early in training, encourage pilots to look outside during climbs, maneuvers, and descents to develop a sense of the Cirrus visual references for climb, level flight, and descents.

Completion Standards

- Maintains positive aircraft control,

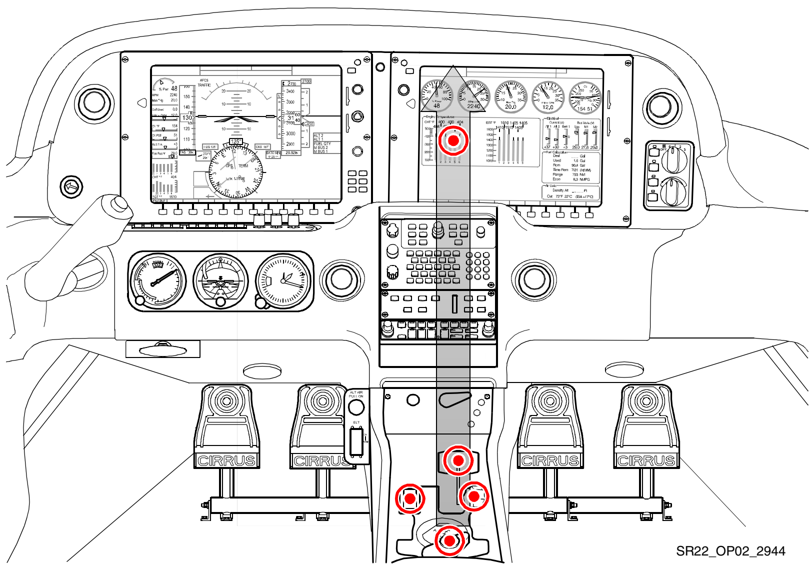
- Retracts the flaps when climbing, clear of obstacles, and at the prescribed airspeed,
- Maintains desired airspeed within +10/-5 KIAS,
- Abides by local noise abatement procedures if applicable,
- Follows instrument departure procedures if applicable,
- Follows ATC instructions and clearances if applicable,
- Completes the Climb checklist as a flow and references the checklist when workload permits,
- Manages engine temperatures through airspeed/pitch control, proper power and mixture settings as recommended by the AFM,
- At pilot's discretion, uses the autopilot to reduce workload,
- Uses proper scanning techniques and Traffic Alert System for collision avoidance,
- Uses supplemental oxygen at the appropriate time during the climb,
- Maintains appropriate cloud clearances during VMC climbs,
- Operates FIKI system properly when flying through icing conditions during departure.

Common Errors

- Inability to maintain desired airspeed while hand flying,
- Over dependence on the autopilot for controlled flight,
- Engaging the autopilot before 400 feet AGL,
- Fails to engage the proper mode of the autopilot,
- Fails to complete Climb checklist items,
- Fails to divide attention and look outside during VFR climbs,
- Fails to become familiar with, program, or follow applicable departure procedures,
- Neglects to monitor engine parameters during climb,
- Fails to set mixture control as required during climb,
- Fails to abide by sterile cockpit rules during climbout,
- Fails to monitor for icing conditions.

Cruise

Complete the Cruise checklist as a flow when time and workload permit. Allow the aircraft to accelerate to cruise speeds before setting the desired cruise power setting. Ensure adequate fuel reserves remain for the intended destination. Normal cruise power settings are between 55% - 85% power with mixture set for best power or best economy. Turbo aircraft will always cruise at best economy.



Cruise Flow

Engine Break-In

For engine break-in of normally-aspirated engines, cruise at a minimum of 75% best power, rich of peak EGT, until the engine has been operated for at least 25 hours or until oil consumption stabilizes. Turbo aircraft may be operated at best economy, lean of peak EGT, with a power setting greater than 75% during engine break-in. Operation at higher power will ensure proper seating of the rings, and is applicable to new engines, and engines in service following cylinder replacement or top overhaul of one or more cylinders.

Procedure (Flow Pattern)

1. Fuel Pump .... OFF / AS REQUIRED

The Fuel Pump may be used for vapor suppression in cruise. Vapor lock issues may be recognized by fluctuating EGTs, CHTs and fuel flows, and rough engine operation. Select BOOST or HIGH BOOST as appropriate if vapor lock is suspected.

2. Power Lever .... SET

   Allow the aircraft to accelerate to cruise speeds before setting cruise power. Select the desired percent power considering range, endurance, and desired performance for the intended flight.

   SR22TN - Reduce the power lever to 2500 RPM with maximum MP. If a lower power setting is desired to increase range/ endurance, reduce the throttle to the desired percent power.

   SR22T - Reduce power lever to 30.5” MP or less.

3. Mixture .... LEAN as required

   SR20/SR22 - Use the Lean Assist feature on the MFD Engine page to set the mixture control for Best Power or Best Economy.

Mixture Description	Exhaust Gas Temperature
Best Power	75° F Rich of Peak EGT
Best Economy	50° F Lean of Peak EGT

   SR22TN/SR22T - Set the fuel flow to the cyan target or less.

4. Engine Parameters .... MONITOR

   Monitor all engine parameters for any abnormal indications that may indicate impending engine problems.

   • SR22TN/SR22T - Lean Mixture to keep all CHTs below 420° F (SR22T) or 380° F (SR22TN). As an approximation, a 0.5 GPH reduction in fuel flow will reduce CHTs by 15° F.

5. Fuel Flow and Balance... MONITOR

   Check fuel flow gauge and ensure fuel balance is within 7.5 gallons (SR20), 10 gallons (SR22).

   Fuel BOOST must be used for switching from one tank to another. Failure to activate the Fuel Pump before transfer could result in delayed restart if the engine should quit due to fuel starvation.

Icing Conditions (FIKI)

Even with an aircraft that is certified to operate in known icing conditions, prolonged flight in icing conditions should be avoided. Pilots should use good pre-flight planning to choose a route and altitude that will minimize time in icing conditions. If this is not possible, consider delaying or cancelling the flight. Pilots should always have an escape option in case of a system malfunction or severe ice encounter. This escape could be above or below the cloud layer or below the freezing level. Note that in some conditions the freezing level may be at the surface or below the MEA.

Pilots may generally escape the worst icing conditions in stratus clouds by making an altitude change of more than 3000 ft. While flying through cumulus clouds, altitude changes may not be effective and lateral deviations may be necessary to escape the worst icing conditions.

During icing encounters in cruise, increase engine power to maintain cruise speed as ice accumulates on the unprotected areas and causes the aircraft to slow down. Sacrifice altitude if necessary in order to maintain safe flying speed.

The autopilot may be used in icing conditions. However, every 30 minutes the autopilot should be disconnected to detect any out-of-trim conditions caused by ice buildup. If significant out-of-trim or other anomalous conditions are detected, the autopilot should remain off for the remainder of the icing encounter. When disconnecting the autopilot with ice accretions on the airplane, the pilot should be alert for out-of-trim forces.

Ice Formation Determination

Typically, a leading edge with a small radius will collect ice more quickly than a leading edge with a large radius. To help monitor possible ice accumulation, a thin metal tab is attached to the outboard end of the right-hand and left-hand stall strips. In some icing conditions this tab may be the first place that airframe ice accretion is noticeable. Additionally, refer to other areas of the aircraft, such as the horizontal tail and lower windscreen, to aid in determining if ice is accreting to the aircraft.

• Caution •

Ice accumulations on protected areas are abnormal.

De-Icing Procedures

1. Pitot Heat .... Verify ON
2. Ice Protect System Switch .... ON
3. Ice Protect Mode Switch .... AS REQUIRED

   Select NORM or HIGH as conditions dictate.

   If icing conditions are inadvertently encountered, press MAX to initially dissipate ice accumulation, then select NORM or HIGH as required by ice accumulation.
4. WIND SHLD Push-Button .... PRESS As Required

   Use the windshield ice protection when residual fluid that is slung off of the propeller will not keep the windshield free of ice. Due to the temporary reduction in visibility, do not use the windshield sprayer within 30 seconds prior to landing.
5. Airspeed ....Maintain 95-177 KIAS and less than 204 KTAS

   Maintaining airspeed within this range will ensure proper pressure distribution over the wings and effective anti-ice system operation. Adjust final approach airspeed to 95 KIAS with 50% flaps when landing with ice adhering to the aircraft.
6. Flaps .... UP

   Keep flaps in the up position until required for landing. Limit flap extension for landing to 50%.
7. Ice Inspection Lights .... AS REQUIRED

   Ice inspection lights will illuminate the leading edges of the wings and horizontal stabilizer in order to monitor ice accumulation and confirm fluid flow at night.
8. Cabin Heat .... HOT
9. Windshield Defrost .... ON

   Windshield defrost set to hot will help to keep the windshield free of ice.
10. Anti-ice Fluid Quantity .... MONITOR

    Ensure adequate quantity to complete flight.
11. Ice Accumulation .... MONITOR

    If ice accretion rate is higher than desired or ice is not shedding, select a higher mode of operation. If ice accretions do not shed, select PUMP BKUP and perform the Anti-Ice System Failure Checklist. Exit icing conditions immediately if ice cannot be shed.

Avionics Configuration

- Autopilot - Ensure correct modes are engaged if desired,
- GCU/Flight Plan - ensure proper navigation is set,
- MFD - Use Lean Assist to lean the mixture. Complete the Cruise Checklist,
- PFD - Monitor aircraft flight parameters and system status.

Instructor Notes

When planning instructional activities it is important to select legs with distances that allow adequate cruise time to accomplish all cruise related tasks and training objectives. Training flights should have 15 - 30 minutes of level cruise flight.

Pilots in training have a tendency to become exceedingly relaxed during cruise. Occasionally, pilots neglect to accomplish basic destination setup tasks such as: descent planning, frequency selection, and airport familiarity without prompting.

To combat this tendency, ensure pilots monitor ETE to the destination during cruise as a reference for descent planning and other arrival-related tasks. Also, make it clear to pilots that they are expected to manage the tasks without prompting from the instructor. Eventually, the pilot must perform all flight related tasks without prompting or questioning. Allowing a pilot to arrive at an airport without having planned a descent usually creates a stressful situation and can be a good learning experience.

Use the cruise portion of a training flight to provide repetitive avionics related tasks or to introduce scenarios or maneuvers required by the syllabus. Allow pilots to make and execute PIC decisions for the scenarios presented. Allow pilots to see the consequences of poor decisions when possible, while never compromising safety of flight.

Completion Standards

- Allows the aircraft to accelerate before setting cruise power,
- Adheres to procedures described in the AFM for setting cruise power and mixture controls,
- Completes Cruise checklist,

- Monitors engine parameters and manages accordingly,
- Establishes the aircraft on the intended course and altitude,
- Ensures adequate fuel reserves will be available when reaching the destination, monitors fuel status throughout the flight,
- Monitors enroute and destination weather periodically,
- Plans arrival and descent before descent is required,
- Keeps the aircraft within fuel balance limitations,
- Monitors the physical state of passengers during cruise, especially important for flights above 10,000 feet MSL,
- Identifies situations that require an altitude or route change, such as: weather, airspace, and traffic,
- Maintains altitude +/-200 feet and headings +/-15 degrees.

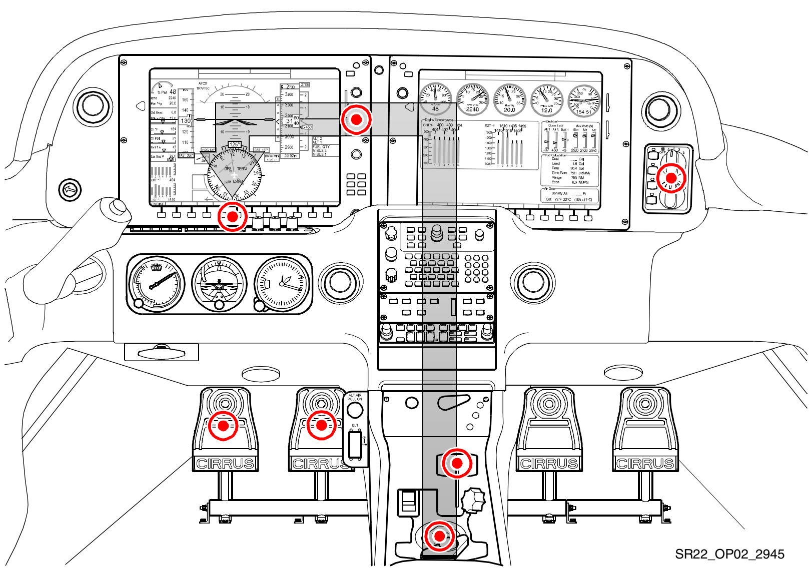
Common Errors

- Exhibits tendencies toward complacency, and fails to monitor flight status, passengers, pilot fatigue, and weather.
- Forgets to plan descents and prepare for arrival,
- Fails to recognize an inadequate fuel quantity situation or exceed the maximum fuel imbalance,
- Fails to set the mixture throughout the descent properly.

Descent

Descents should be planned during cruise considering the amount of altitude to lose, distance and time to destination, ATC restrictions, obstacle/terrain clearance, desired rate of descent, and engine care. Use the vertical navigation function of the GPS to assist descent planning. To manage workload, complete the descent checklist at the top of descent or at least 20 minutes from the destination. Set appropriate frequencies and review weather to determine the active runway. Verify GPS units are programmed as desired for the arrival and approach into the airport.

During descent, power should be used to manage airspeed and maintain engine temperatures as desired. Maintain airspeed within the green arc if turbulence is expected or encountered during the descent. Use caution and avoid excessive maneuvering when airspeed is within the yellow arc during the descent. Complete the Descent checklist as a flow when time and workload permit upon initial descent to land. Reference the checklist to verify all items are complete once the flow has been completed.



Descent Flow

Procedure (Flow Pattern)

1. Oxygen .... AS REQUIRED
2. Altimeter .... SET

   Verify the proper altimeter setting has been set into the PFD and in the standby altimeter.
3. Cabin Heat/Defrost .... AS REQUIRED
4. Landing Light .... ON

   The landing light should be selected on for visibility to others at the top of the descent or within 10NM from the destination. If in IMC, consider leaving off to reduce light reflection in the cabin.
5. Fuel System .... CHECK

   Ensure fuel is balanced and selected to the fullest tank.
6. Mixture .... AS REQUIRED

   SR20 - It is not necessary to adjust the mixture during descent.

   SR22 - Consider altitude when setting mixture for descent. Full mixture settings at high altitudes may lead to engine roughness or flooding resulting in engine loss.

   SR22TN/SR22T - Set the fuel flow to the cyan target or less.
7. Brake Pressure .... CHECK

   Apply pressure to each toe brake and ensure resistance is felt. A soft or mushy feeling in the brakes could indicate a brake failure.

Rapid Descent (SR22TN/SR22T)

1. Power Lever .... REDUCE MP to 18-20” Hg

   Pitch the aircraft to the top of the green arc on the airspeed indicator,
2. Mixture ....Maintain CHTs above 240º F

Avionics Configuration

- Autopilot - Engage the modes on autopilot for descent as desired,
- GCU/Flight Plan - Verify that the correct navigation information is set,
- MFD - Complete the Descent checklist, monitor the map for situational awareness,

- PFD - Set Altitude Bug as appropriate for the descent. Monitor the aircraft flight parameters.

Instructor Notes

Planning descents is an important skill for both VFR and IFR pilots. Pilots that have not flown a high performance aircraft typically require additional briefing time and practice to master descent planning.

Pilots should base descent planning and completion of arrival tasks on ETE to destination, not distance to destination. Pilots using distance to destination for planning purposes typically get behind the aircraft and fail to complete important arrival tasks. Using ETE instead will help pilots adapt to the faster speeds of the Cirrus.

Similar to climbs, pilots should occasionally hand-fly descents to maintain proficiency controlling the aircraft while managing all other flight related activities. The autopilot should be used during periods of high workload especially when flying single pilot IFR.

The VNAV feature of the Perspective avionics is a great tool for planning and performing calculated descents. However, it is important to note that many pilots miss the programming steps required to make the autopilot fly the calculated descent. Pilots must be able to describe key elements related to VNAV setup and control. Also, have pilots demonstrate the ability to cancel VNAV.

Pilots with less experience commonly have trouble visualizing runway layout and traffic pattern entry. The extended center line and range/ panning tools in the Perspective avionics will help pilots visualize entry into the airport environment. It is also possible to engage the OBS mode and set the inbound course to the airport to the desired runway. Do so only after the airport is in sight. Loading an approach into the flight plan for the intended runway may also be helpful for pilots to maintain situational awareness.

Completion Standards

- Starts descent at the calculated top of descent and at the calculated descent rate,
- Maintains positive aircraft control with emphasis on airspeed and vertical descent rate,
- Adheres to ATC and airspace restrictions throughout the descent,

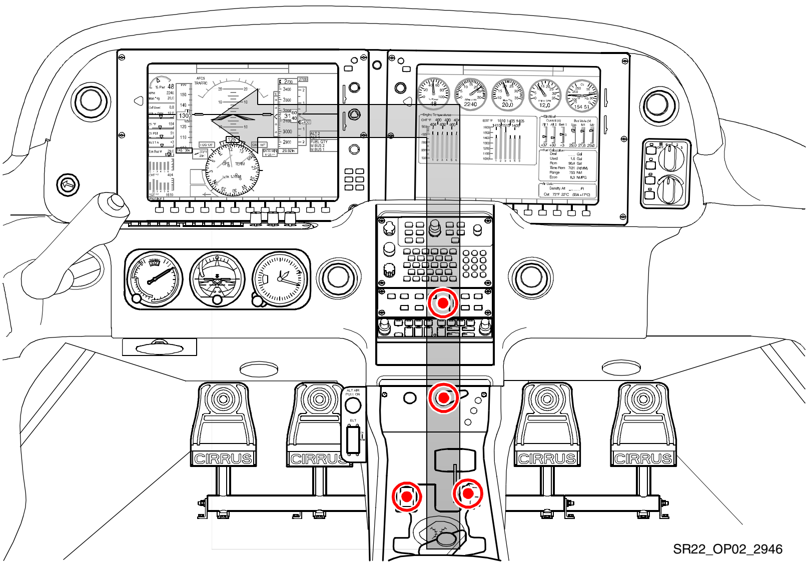
- Maintains airspeed below V_{NO} while descending in turbulent conditions or if turbulence is expected in the descent,
- Recognizes a steep descent, usually due to ATC restrictions, and manages airspeed and descent rates accordingly,
- Monitors for icing conditions during descents in IMC,
- Uses the correct modes of the autopilot to assist in workload management while preparing for arrival/landing,
- Completes the Descent checklist as flow pattern and references the checklist when workload permits.

Common Errors

- Fails to start the descent at the appropriate time using the necessary descent rate,
- Fails to consider passenger comfort when selecting descent rates and/or airspeed,
- Neglects to complete the Descent checklist items in a timely manner,
- Fails to complete airport arrival tasks and planning,
- Fails to slow to a speed that allows the pilot to perform a stabilized approach in a timely manner,
- Controls or reduces power too aggressively or abruptly,
- Allows airspeed to decay unknowingly during level-off with low power settings,
- Does not trim the aircraft for changes in airspeed throughout the descent.

Before Landing and Traffic Pattern

Complete the Before Landing checklist as a flow prior to entering the traffic pattern when time and workload permit. Slow the aircraft early enough to allow for an easy transition into the traffic flow and enough time to ensure the aircraft is configured for landing. The following profile describes a normal traffic pattern. Pilots should use this profile as a guide when entering the traffic pattern on the downwind leg and modify as appropriate for base entry or straight-in approaches.



Before Landing / Traffic Pattern Flow

Procedure (Flow Pattern)

1. Seat Belt and Shoulder Harness ....Secure

   Ensure the seat belt and shoulder harness is secure for all occupants in the aircraft.

2. Fuel Pump .... BOOST

3. Mixture .... AS REQUIRED

   SR20 - Mixture full rich for all altitudes.

   SR22 - Mixture as required for altitude. Reference the green arc on the fuel flow gauge or the Max Power Fuel Flow placard for mixture setting. Avoid rich mixture settings at high elevations.

SR22TN/SR22T - Mixture full rich for all altitudes.

The mixture should be placed in the landing position prior to entering the traffic pattern or prior to the FAF on an instrument approach.

4. Flaps .... AS REQUIRED

   Reference the Traffic Pattern Profile or Approach Profile for information on the appropriate use of flaps

5. Autopilot .... AS REQUIRED

   It is recommended to disconnect the autopilot prior to entering the traffic pattern. Ensure yaw damper is off prior to landing.

Avionics Configuration

- Autopilot - Disengage the autopilot prior to entering the traffic pattern, verify the yaw damper is disconnected,
- MFD - Complete the Before Landing checklist, monitor Map for situational awareness,
- PFD - Monitor aircraft flight parameters.

	SR20	SR22	SR22TN	SR22T
Downwind	50% / 20” MP	30% / 15” MP	50% / 15” MP	40% / 15” MP
Abeam/Base	25% / 12” MP	15% / 12” MP	25% / 12” MP	30% / 12.5” MP
Final	As Required	As Required	As Required	As Required

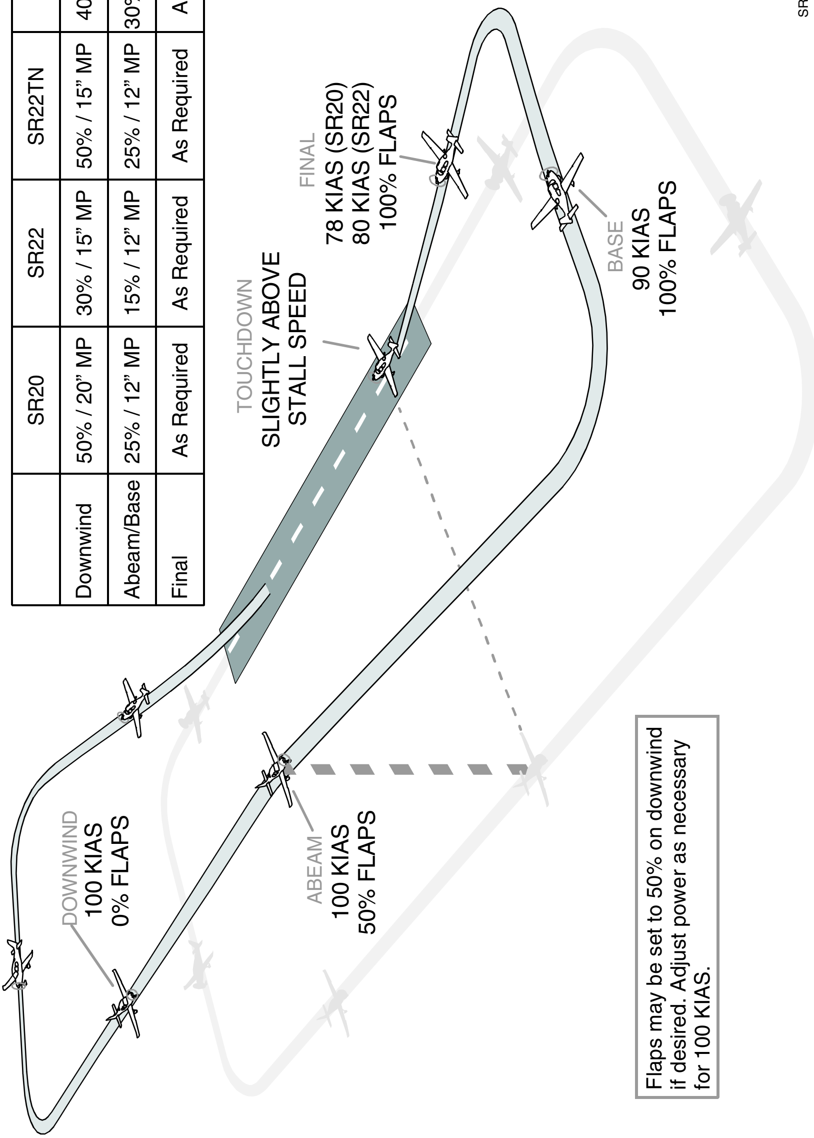


Figure 3-2
Traffic Pattern Profile

Instructor Notes

In addition to providing safe traffic flow, traffic patterns set the framework for a stabilized approach to landing. The pilot's ability to make frequent and substantial power changes, maintain precise airspeed and altitude control, and change trim and aircraft configuration in a compressed time frame is tested in the traffic pattern. Pilots transitioning into an SR22 from a lower-powered aircraft will be surprised by how quickly the aircraft climbs to traffic pattern altitude.

Pilots should be able to describe traffic pattern airspeeds, approximate power settings, and desired aircraft configurations before attempting traffic patterns. It is also beneficial for the pilot to develop basic aircraft control skills by conducting slow flight, stalls, and steep turns before attempting traffic patterns and landings. Pilots should also be able to properly control the pitch attitude of the aircraft while making flap changes.

The SR20 and SR22 are capable of quickly obtaining speeds greater than 130 KIAS in the traffic pattern with improper power management. Demonstrate proper power inputs to pilots in training and always emphasize precise airspeed control. Flying at normal traffic pattern speeds is critical for collision avoidance and stabilized approaches to landings.

Completion Standards

- Slows the aircraft to recommended downwind speed before mid-field downwind,
- Completes Before Landing checklist before entering the traffic pattern,
- Properly communicates with ATC or other traffic in the local area,
- Enters the traffic pattern complying with local procedures, ATC clearances, and prescribed traffic pattern procedures,
- Maintains traffic pattern altitude on downwind +/-100 feet, airspeed +/-10 KIAS,
- Establishes a controlled descent, manages aircraft configuration and airspeed as described above with airspeed +/-5 KIAS
- Maintains proper spacing from other aircraft in the traffic pattern,
- Disconnects the autopilot before entering into the traffic pattern.

Common Errors

- Carries excessive speed on the downwind leg due to improper planning and power management,
- Enters downwind leg above traffic pattern altitude due to improper descent planning and/or power management,
- Fails to follow standardized power and aircraft configuration changes in the traffic pattern,
- Fails to compensate for ballooning when deploying the flaps, resulting in an excess loss of airspeed and/or altitude gain,
- Fails to maintain coordinated flight throughout the traffic pattern,
- Has trouble visualizing and becoming oriented with runway configuration resulting in confusion and non-standard pattern entry,
- Exhibits poor airspeed control during downwind, base, and final,
- Fails to reduce power and pitch on the upwind or crosswind leg resulting in excessive airspeed and/or altitude above traffic pattern altitude.

Stabilized Approach Definition

A stabilized approach is critical to a safe, successful landing. A stabilized approach is characterized by a constant angle and constant rate of descent approach profile ending near the touch-down point. Stabilized approach criteria apply to all approaches including practice power-off approaches.

VFR Stabilized Approach Definition

All briefings and appropriate checklists should be completed by 500' AGL in visual conditions.

A VFR approach is considered stabilized when all of the following criteria are achieved by 500' AGL:

- Proper airspeed,
- Correct flight path,
- Correct aircraft configuration for phase of flight,
- Appropriate power setting for aircraft configuration,
- Normal angle and rate of descent,
- Only minor corrections are required to correct deviations.

A go-around must be executed if the above conditions are not met and the aircraft is not stabilized by 500' AGL.

Instructor Notes

While keeping in mind that many factors contribute to approach stability, airspeed is arguably the most critical factor. The probability and severity of an accident are most affected by mismanagement of airspeed. Do not allow pilots to become complacent with regards to precise airspeed control during approach and landing. While on final approach in visual conditions the pilot's attention should be focused primarily on two things: airspeed and the runway. Pilots must understand the relationship between pitch, power, and airspeed to accurately assess unstabilized situations and to apply accurate and timely corrections. Repetitively practicing approaches at altitude in landing configurations (slow flight) will help the pilot develop and understand these basic principles of flight. For example, have the pilot establish a 500 fpm descent with 100% flaps at 90 KIAS. Then prompt the pilot to maintain the same descent rate, but slow to 80 KIAS. Or, have the pilot maintain 80 KIAS and vary the descent rate. The pilot should be aware of the power and pitch changes required to perform the specified task and apply the same types of corrections on final approach to landing. This exercise will help the pilot become familiar with the magnitude of control inputs when transitioning into the aircraft.

IFR Stabilized Approach Definition

All briefings and appropriate checklists should be completed prior to the IAF for instrument conditions.

An IFR approach is considered stabilized when all of the following criteria are met prior to the FAF, and continues to touch-down:

- Proper airspeed,
- Correct flight path,
- Correct aircraft configuration for phase of flight,
- Appropriate power setting for aircraft configuration,
- Normal angle and rate of descent,
- Only minor corrections with pitch and power are required to correct airspeed and glide path deviations,
- Normal bracketing (+/- 5º) is used to correct for lateral and vertical navigation deviations.

• Note •

Keep flaps at 50% for landing unless the runway is in sight and landing is assured before 500’ AGL. Ensure sufficient runway length is available for a 50% flap landing.

A missed approach must be executed if the above conditions are not maintained during an instrument approach.

Instructor Notes

Performing a stabilized instrument approach, especially while hand-flying, requires good airmanship skills, knowledge of IFR and ATC procedures, ability to divide attention, and mastery of avionics tasks. Instrument rated pilots that desire to develop IFR skills during Cirrus courses must be current, active, and knowledgeable IFR pilots. Otherwise, basic instrument objectives will need to be added to the main Cirrus course objectives, adding more time to the transition course. Sometimes, it is advantageous for pilots to become VFR proficient and acquire PIC time before attempting an IPC or advanced instrument training.

Instrument Approach Procedures

The following Approach sections outline the operating procedures for executing precision and nonprecision approaches. The information describes the best way to configure the aircraft for given instrument procedures, complete checklist items, and configure avionics in Cirrus aircraft. The purpose of this section is to supplement the information in the POH and provide greater guidance on the completion of various instrument procedures in the aircraft. The techniques outlined in this section may not be inclusive of all variables encountered in the national airspace system. Pilots should follow these standard procedures when applicable and exercise good judgment for non-standard procedures. To reduce workload during the descent and instrument approach procedure follow these recommendations.

- Obtain destination weather information as soon as possible to determine active runways and applicable approaches,
- Set applicable COM and NAV frequencies prior to descent,
- Use the autopilot while briefing and preparing for the approach,
- Reduce unnecessary communications and distractions during the approach,
- Use the Descent and Before Landing flows outlined in this manual to complete checklist and avionics set up procedures. Always reference the checklist after the flow is complete,
- Brief the approach using the guidelines listed in this section.

Instructor Notes

In an effort to reduce pilot workload and pilot-induced errors, Cirrus Perspective is designed to complete many avionics-related tasks automatically when IAPs are properly loaded and activated into a flight plan. These automated tasks include:

- Automatic ILS/VLOC frequency tuning,
- Automatic ILS/VLOC frequency identification,
- Automatic CDI navigation source selection,
- Automatic CDI course tuning for GPS and ILS,
- Automatic GPS course guidance for holding patterns, procedure turns, and missed approaches.
- Automatic missed approach waypoint sequencing and CDI source selection after pressing the Go-around button.

It is important for pilots to recognize and verify that all tasks required to execute an IAP are completed. These basic tasks include:

- Approach briefing with emphasis on approach altitudes, DAs/ MDAs, and missed approach procedures,
- Verification of applicable approach frequencies,
- Verification of CDI source, GPS, or VLOC
- Verification of CDI course,
- Marker beacons on, if applicable.

It is common for pilots to be confused as to when to load an approach and when to activate the approach. It is important for pilots to understand how loading and activating changes flight plan sequencing. Here is a short explanation for loading and activating.

Loading an approach via the PROC button simply allows the pilot to select an approach, including the desired transition, and store it in the flight plan. This is done once the expected approach is known to reduce future workload. Only one IAP may be stored in the active flight plan at a time. Loading a separate approach, or the same approach with a different transition, will simply replace the existing approach.

Activating an approach via the PROC button causes the flight plan to change the active navigation course. The response is different based upon the transition that was selected, either vectors to final (VTF) or an IAF. When VTF is selected as the transition and the approach is activated, the system will automatically set the CDI course to the final approach course and changes the navigation source from GPS to the appropriate navigation source for the approach. VTF should be activated when ATC assigns vectors for the approach.

If an IAF was selected, activating the approach will change the active course to a present position, direct-to the IAF. This should only be done when, and only when, ATC clears the pilot to that IAF.

Pilots who incorrectly re-activate approaches during an approach, typically after being cleared for the approach by ATC, risk breaking an ATC clearance and induce excess workload and confusion. This action is a sign that the pilot does not understand how the system responds to loading and/or activating approaches.

It should be noted that pilots who are ‘behind the aircraft’ when approaching the airport environment typically forget to slow the aircraft to the recommended approach speeds, leaving themselves with less time to accomplish required tasks. Pilots who rush into the approach unprepared typically do not have the situation under control and have difficulties prioritizing tasks. Aircraft control is always the number one priority. Pilots that have difficulty maintaining aircraft control while dividing attention typically need more basic attitude instrument flying training. Provide avionics-related tasks while having the pilot hand-fly in simulated or actual conditions before continuing with more advanced IAP training. Additional avionics practice may also be required. Pilots should demonstrate the ability to construct IFR flight plans in the avionics and navigate pages with minimal errors before attempting IAPs.

Sometimes, instrument training in simulated instrument conditions is the only option available. However, pilots who conduct instrument training solely under simulated conditions are typically out-performed by pilots that have trained in actual conditions. This is especially true during the first IFR 'solo'. It is highly recommended that instrument training be conducted in actual conditions whenever possible. Cirrus courses are flexible in nature; modify courses as necessary to take advantage of IMC conditions when available. Also, watch for forecasted IMC and schedule instrument training flights accordingly.

See the following sections for common errors relating to instrument approach procedures.

Approach Briefing

The purpose of an approach briefing is to prepare the pilot to execute an instrument approach procedure. Pilots should brief the instrument approach procedure when time and workload permits. Preferably, the approach should be briefed approximately 20 minutes prior to the IAF or start of vectors. The approach briefing should include the following items:

- Type of procedure and runway (e.g. ILS 35L),
- Transition to final (vectors or IAF),
- Applicable COM and NAV frequencies,
- Approach altitudes and DA or MDA,
- Airspeeds and configuration changes,
- MAP and missed approach procedure.

Sample Approach Briefing

This will be a _________ (ILS, GPS…) approach to RWY______ via the _______ transition (VTF or IAF). The proper navigation source (GPS, VLOC) for the approach is selected and the proper course of _____ is set in the HSI. Applicable approach frequencies are tuned and identified. Final approach speed is ______ KIAS with approach flaps (50%) set prior to the FAF. Call out 1000 feet, 500 feet and 100 feet above minimums. The minimum altitude for the approach is _______ feet. The missed approach procedure is climb to _______ altitude and turn left/right to the _________ fix and hold.

Instructor Notes

The use of electronic approach charts on the MFD greatly reduces cockpit workload and clutter. Encourage pilots to use electronic charts when available, but caution pilots not to rely on electronic charts completely for all charting needs. Charts will not be available electronically if the MFD is inoperative, the database has expired, or the MFD is in reversionary mode. It is recommended to carry alternative charts at least for the destination and planned alternate airport.

Setting the baro-minimums to the DA or MDA with the PFD Time/Reference function or when loading an approach into the flight plan is a great tool and highly encouraged. Pilots with higher personal weather minimums should set the baro-minimums to the lowest altitude they intend to fly on that particular approach. Reference the Envelope of Safety for recommended approach minimums.

It is also recommended that pilots account for speed and aircraft configuration changes when briefing an approach. Doing so makes the pilot consciously plan all aspects of conducting an approach. With the added speed capabilities for flap operations in the SR22 G5 aircraft, the pilot may elect to use 50% flaps during descents at higher angles to better manage airspeed.

For example, “at XXXXX intersection, I will maintain 2600 feet and 120 KIAS. When the glideslope becomes active, I will set flaps to 50% and slow to 100 KIAS and wait for GS intercept.”

Precision Approach Procedure

The following section provides guidance for executing a precision approach using vectors to final or full procedure as the transition. The precision approach profile may be used for ILS, LPV, and LNAV/VNAV approaches, or any approach that has lateral and vertical course guidance.

Avionics Configuration

Autopilot (If Desired)

Approach Segment	Garmin GFC 700		S-Tec 55X / 55SR	
	Lateral Mode	Vertical Mode	Lateral Mode	Vertical Mode
Vector to Final	HDG[a]	As Required	HDG	As Required
Cleared to IAF	NAV (GPS)	As Required	NAV GPSS	As Required
Proc Turn Outbound / Course Reversal	NAV (GPS)	As Required	NAV GPSS	As Required
Inbound to FAF	APR (GPS/LOC)	ALT	NAV APR	ALT
FAF Inbound	APR (GPS/LOC)	GS or GP	NAV APR	GS or VS[b]
Missed Approach	GA[c]	GA	NA	NA

a. Arm NAV when cleared to intercept final, arm APR when cleared for the approach.
b. 55SR cannot track glideslope. Use VS mode and appropriate descent rate to track GS.
c. Press the Go-around button at the decision altitude or missed approach point. Ensure the altitude bug is set to the assigned missed approach altitude.

FMS

- Load approach with assigned transition (VTF or IAF) and set the appropriate BARO minimums for the approach,
- Verify all Flight Plan waypoints are correct including course reversals,
- Activate the approach at the start of approach vectors or when cleared direct to the IAF,
- Verify all approach frequencies are tuned and identified,

- Verify the navigation mode switches from GPS to LOC on an ILS approach when inbound to FAF.

MFD

- Reference charts for approach information and briefing,
- Reference the electronic checklist at the completion of the Descent and Before Landing flows.

PFD

- Set the Altitude bug for the Missed Approach Altitude (DA with S-Tec AP) once established inbound to FAF,
- Sync the HDG bug for the wind correction heading once established inbound on the final approach course.

Instructor Notes

The pathways on the PFD, flight path indicator, and runway depictions associated with SVT are good situational awareness tools for pilots. Pilots must understand the purpose and function of the flight path indicator as it relates to aircraft flight path in order to fully comprehend and use this valuable tool. Pilots should be proficient flying through boxes during enroute phases before attempting to use the boxes on approach.

To mimic the narrowing signals of the localizer and glide-slope, the pathway boxes shrink as the aircraft nears the end of the runway. As with any approach, it is important for the pilot to be stabilized early on the approach with proper power, airspeed, trim, and wind correction.

Pilots must demonstrate the ability to both hand-fly the aircraft and properly use the autopilot to fly precision approaches. A common instructional strategy is to have the pilot use the autopilot until the pilot properly programs the autopilot to intercept and track the localizer and glideslope, then prompt the pilot to disconnect and hand fly. Pilots can also demonstrate the ability to program the autopilot through the use of the flight director. Instructors will be able to assess the pilot's ability to use proper autopilot modes and the ability to hand-fly simultaneously with the flight director.

Clearance for the approach allows the pilot to intercept and track the inbound course and descend to the MDA or DA. Pressing APR on the autopilot will arm the glide-slope intercept. As a rule of thumb, press the APR button on the autopilot control panel when ATC has cleared the pilot for approach.

Completion Standards

- Complies with all ATC clearances, instructions, and procedures in a timely manner,
- Establishes aircraft configuration and airspeed as recommended in this manual,
- Completes the Descent and Before Landing checklists prior to the FAF,
- Completes an approach briefing before becoming established on a published segment of the approach,
- Before the FAF, maintains altitude +/-100 feet, airspeed +/-10 KIAS, headings within +/-10 degrees, and accurately tracks radials, courses, and bearings,
- Completes all avionics related tasks correctly and at the proper time based upon ATC clearances,
- Maintains a stabilized final approach, from the FAF to DA allowing no more than three-quarter-scale deflection of either localizer or glideslope and maintains airspeed +/-10 KIAS,
- Promptly initiates a missed approach from the DH if required visual references for the runway are not unmistakably visible,
- Transitions to a normal landing considering all regulatory requirements to descend below a DA,
- Maintains localizer and glideslope deviations within three-quarter-scale deflections during visual descent until glide-slope signal must be abandoned to accomplish a normal landing.

Common Errors

- Fails to slow the aircraft to provide adequate time for approach preparation,
- Fails to configure the aircraft as recommended in this section,
- Exhibits improper airspeed management during level-off or start of descents during the approach,
- Neglects to verify that the autopilot is active and armed modes,
- Fails to activate the approach in the flight plan at the proper time,
- Fails to brief missed approach procedures.

Approximate Power Settings	SR20	SR22	SR22TN	SR22T
Start of Vectors / Cleared to IAF	As required	As required	As required	As required
Final Intercept	As required	As required	As required	As required
1/2 Scale Below Glideslope	50% / 22" MP	30% / 15" MP	50% / 15" MP	40% / 15" MP
FAF Inbound	25% / 12" MP	15% / 12" MP	25% / 12" MP	30% / 12.5" MP
Missed Approach	Full Power	Full Power	Full Power	Full Power

Precision Approach Briefing Elements

- Type of procedure and runway (e.g. ILS 31),
- Transition to final (VTF or IAF),
- Applicable Nav and Com frequencies,
- DA/MDA,
- MAP and missed approach procedure.

• Note •

- Set ALT bug to the Missed Approach altitude prior to the FAF,
- Sync the HDG bug once established inbound, on the final approach course,
- Execute a missed approach anytime the outlined stabilized approach criteria are not met.

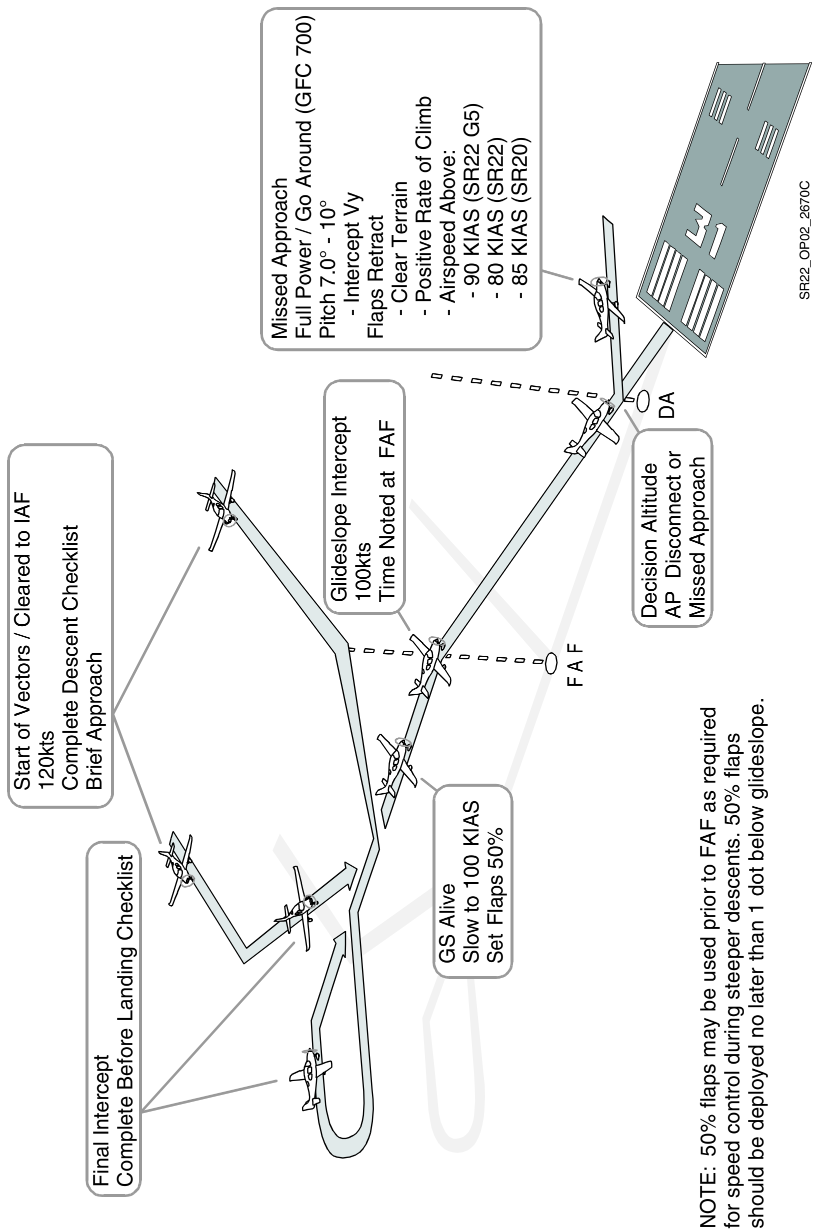


Figure 3-3
Precision Approach Profile

Nonprecision Approach Procedure

The following provides guidance for executing a nonprecision approach with no vertical guidance using vectors to final or full procedure as the transition. The nonprecision profile may be used for VOR, Localizer, Localizer Back Course, GPS, or any approach that only has lateral course guidance.

Avionics Configuration

Autopilot (If Desired)

Approach Segment	Garmin GFC 700		S-Tec 55X / 55SR	
	Lateral Mode	Vertical Mode	Lateral Mode	Vertical Mode
Vector to Final	HDG[a]	As Required	HDG	As Required
Cleared to IAF	NAV (GPS)	As Required	NAV GPSS	As Required
Proc Turn Outbound / Course Reversal	NAV (GPS)	As Required	NAV GPSS	As Required
Inbound to FAF	NAV (GPS, VOR, LOC, BC)	ALT	GPSS (GPS) APR (VOR/ LOC)	ALT
FAF Inbound	APR (GPS, VOR, LOC, BC)	VS + ALTS	GPSS (GPS) APR (VOR/ LOC)	VS +ALT
Missed Approach	GA[b]	GA	NA	NA

a. Arm NAV when cleared to intercept final, arm APR when cleared for the approach.
b. Press the Go-around button at the decision altitude or missed approach point. Ensure the altitude bug is set to the assigned missed approach altitude.

FMS

- Load approach with assigned transition (VTF or IAF) and set appropriate BARO minimums for the approach,
- Verify all Flight Plan waypoints are correct including course reversals,
- Activate the approach at the start of approach vectors or when cleared direct to the IAF,
- Verify all approach frequencies are tuned and identified,

- Verify the navigation mode is set as required (GPS, VOR, LOC, or BC).

MFD

- Reference charts for approach information and briefing,
- Reference the electronic checklist at the completion of the Descent and Before Landing flows.

PFD

- Set Altitude bug for the Minimum Descent Altitude (MDA) once established inbound to FAF,
- Set the HDG bug for the wind correction heading once established inbound on the final approach course.

Instructor Notes

A GPS approach or GPS overlay approach are the most common type of nonprecision approaches conducted in Cirrus aircraft. Encourage pilots to choose a GPS approach over VOR or LOC approaches when presented with the option. GPS WAAS approaches provide better situational awareness than approaches that lack a glide-slope or glide path indication.

Because VOR, LOC, and LOC BC approaches are rarely performed during IFR flight, it is important to practice these types of approaches during initial instrument and recurrent training to ensure that proficiency is developed and maintained. The lesser-used approaches are practiced for the same reasons that missed approaches and holds are practiced, they are uncommon procedures, but pilots may be required to perform these from time to time.

A GPS approach with glide path has many similarities to an ILS approach with respect to the procedures required to: load and activate the approach, aircraft configuration, airspeed control, and autopilot mode selection. It is important to highlight these similarities during training.

Non precision approaches that require step downs present airspeed and altitude control challenges for many pilots. A pilot’s inability to hold airspeed and altitude within standards is a signal that more basic attitude instrument flying is needed. Present the pilot with avionics related tasks such as, tuning communication frequencies for modifying flight plans when practicing BAIF to ensure the pilot is proficient with dividing attention while maintaining aircraft control.

Completion Standards

- Complies with all ATC clearances, instructions, and procedures,
- Establishes aircraft configuration and airspeed per recommendations described in this manual,
- Completes the Descent and Before Landing checklists prior to the FAF,
- Completes an approach briefing before being established on a published segment of the approach,
- Pre FAF, maintains altitude +/-100 feet, airspeed +/-10 KIAS, headings +/-10 degrees, and accurately tracks radials, courses, and bearings,
- Correctly completes all avionics related tasks at the proper time based upon ATC clearances,
- Ensures GPS RAIM is available and the CDI is in APR mode before commencing the approach past the FAF and determines the appropriate approach minimums,
- Maintains a stabilized final approach from the FAF to MAP allowing no more than three quarter scale CDI deflection, with airspeed +/-100 KIAS, and altitude within +100 / -0 feet from the MDA,
- Promptly initiates a missed approach from the MAP if required visual references for the runway are not unmistakably visible,
- Transitions to a normal landing, considering all regulatory requirements to descend below a MDA.

Common Errors

- Fails to slow the aircraft to provide adequate time for approach preparation,
- Fails to verify CDI sensitivity and RAIM,
- Fails to configure the aircraft as recommended in this section,
- Exhibits improper airspeed management during level-off or start of descents during the approach,
- Fails to verify the autopilot's active and armed modes,
- Fails to activate the approach in the flight plan at the proper time,
- Fails to brief missed approach procedures.

Approximate Power Settings	SR20	SR22	SR22TN	SR22T
Start of Vectors / Cleared to IAF	As required	As required	As required	As required
Final Intercept	As required	As required	As required	As required
2 NM to FAF	50% / 22" MP	30% / 15" MP	50% / 15" MP	40% / 15" MP
FAF Inbound	25% / 12" MP	15% / 12" MP	25% / 12" MP	30% / 12.5" MP
Missed Approach	Full Power	Full Power	Full Power	Full Power

Nonprecision Approach Briefing Elements

- Type of procedure and runway (e.g. LOC 31),
- Transition to final (VTF or IAF),
- Applicable Nav and Com frequencies,
- MDA,
- MAP and missed approach procedure.

• Note •

- Set ALT bug to the MDA prior to FAF,
- Sync the HDG bug once established inbound,
- Execute a missed approach anytime the outlined stabilized approach criteria are not met.

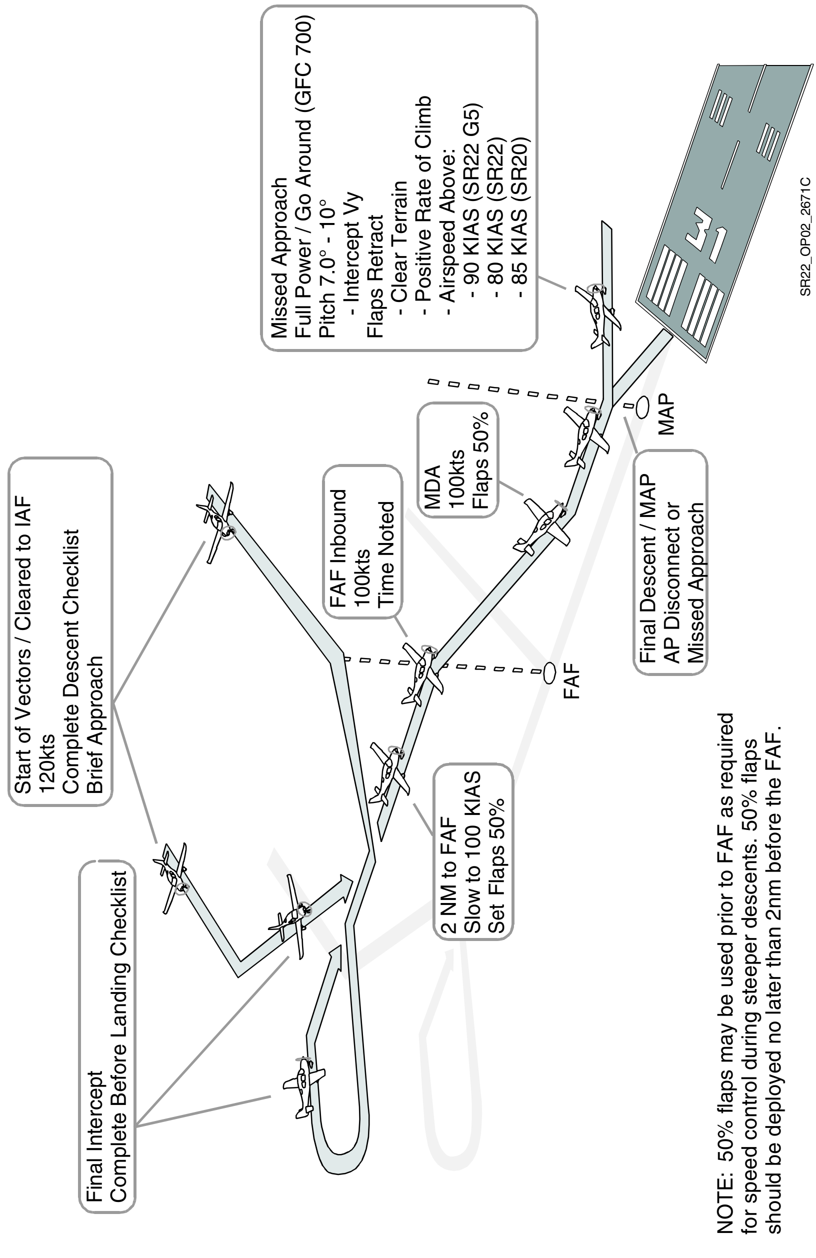


Figure 3-4
Nonprecision Approach Profile

Go-Around

A go-around should be executed anytime an approach does not meet the stabilized approach criteria outlined in this manual for instrument or visual conditions. A go-around should be completed from memory since it is a time critical maneuver.

In addition to the stabilized approach criteria, execute a go-around/ missed approach for these conditions:

- Excessive ballooning during round-out or flare,
- Excessive bouncing or porpoising,
- Landing beyond the first third of the runway,
- Any condition when a safe landing is in question.

The first priority of executing a go-around is to stop the aircraft's descent. Smoothly and promptly apply full power while simultaneously leveling the wings and pitching the aircraft to stop the descent. Maintain coordination while adding power by applying rudder pressure. Retract the flaps to 50%. Do not fully retract the flaps at this point in the go-around because it may lead to excessive altitude loss.

Begin pitching for a climb attitude once the aircraft's descent rate has been stopped and the aircraft is accelerating. Pitch for V_X if obstacle clearance is an issue. Pitch for V_Y for all other situations. Retract flaps to 0% once the aircraft is climbing, clear of obstacles, and above 80 KIAS (SR22), 85 KIAS (SR20), or 90 KIAS (SR22 G5).

Procedure (Memory)

1. Autopilot ....DISENGAGE

   GFC 700 - Disengage the autopilot by pressing the go-around button located on the throttle. The yaw damper will remain engaged after pressing the go-around button.

   • Note •

   Press the go-around button on the throttle handle when executing a missed approach from an IAP for aircraft equipped with the GFC 700 autopilot.

   S-Tec 55X/SR - Disengaged the Autopilot by pressing the AP DISC on the control yoke.

2. Power Lever ....FULL FORWARD

Increase power lever to the full forward position. Ensure full power is used and do not stop at any detents along power lever travel.

3. Flaps 50%

   Select flaps to 50% to decrease drag and maintain maximum lift as a climb is initiated.

4. Airspeed... SEE BELOW

   SR20 - 81 to 83 KIAS

   SR22 - 75 to 80 KIAS

   SR22 G5 - 80 to 85 KIAS

5. Flaps .... UP

   Verify flaps have been retracted to 0%. If not, ensure the following criteria is met before retracting the flaps:

   - SR20 - 85 KIAS
   - SR22 - 80 KIAS
   - SR22 G5 - 90 KIAS
   - Positive rate of climb
   - Clear of terrain and obstacles
   - FIKI - Retract as soon as practical once conditions are met. Extending flaps in icing conditions can reduce the effectiveness of the elevator and horizontal stabilizer and could potentially lead to a tail stall.

Instructor Notes

Pilots should never be completely committed to a landing under normal circumstances. All too often, a pilot continues an unstabilized approach and attempts or allows a landing that results in a loss-of-control situation. Pilots must be able to identify safe from unsafe situations, must possess the judgement to abort a bad approach early on, and must possess the skills to execute a go-around properly. These skills are basic private pilot skills that might get neglected over time.

Go-around practice is an important element of Cirrus training courses for many reasons. For one, the procedures related to executing a go-around in a Cirrus aircraft may be very different than those used with other types of aircraft. Another reason to practice go-arounds is that they are seldom practiced or executed outside the training environment.

It is recommended to practice go-around procedures at altitude before attempting a practice go-around in the traffic pattern. Include this practice during incipient stall practice or when recovering from slow flight. Practice go-arounds at 500 feet AGL, 200 feet AGL and from round-out altitudes. Closely guard the flight controls, rudder controls, throttle, and flap control when the pilot is practicing or attempting a go-around.

The go-around checklist procedure should be executed by memory without hesitation once the decision to go-around is made.

Place significant emphasis on aircraft coordination when practicing a go-around. Pilots should instinctively apply proper rudder inputs when applying high power settings at low airspeeds.

Student pilots or pilots transitioning into a new aircraft often put the aircraft into an unstabilized situation that requires a go-around. During training, take advantage of real-life situations that require a go-around. Ideally, the pilot will initiate the go-around which demonstrates he or she can recognize an unsafe situation and make a good decision to abort the landing.

Pilots that fail to initiate a go-around may not be able to recognize an unsafe situation or may not possess the judgement to abort. Allow these pilots to continue the unstabilized approach within your comfort level. Ask pointed questions addressing the unstabilized approach. Hopefully, questioning will prompt the pilot into action. Never allow the aircraft to enter an unrecoverable or unsafe situation.

Praise pilots for good decisions when they initiate a go-around.

Completion Standards

- Makes a timely decision to discontinue the approach or landing considering approach stability, clearances, and runway obstructions,
- Applies full power immediately and transitions to a climb pitch attitude for V_y, and maintains V_y +10/-5 KIAS,
- Retracts flaps from 100% to 50% after full power is applied and pitch attitude is established,
- Retracts flaps when climbing, clear of obstacles and airspeed above 85 (SR 20), 80 KIAS (SR22/T), or 90 KIAS (SR22 G5) respectively,

- Assesses potential traffic conflicts and maneuvers as required to avoid traffic conflicts,
- Announces the go-around to the control tower or local traffic after the aircraft is climbing at the desired airspeed with configuration set and when workload permits.

Common Errors

- Fails to recognize and initiate a go-around,
- Fails to apply full takeoff power,
- Fails to maintain coordination during a go-around,
- Neglects to disconnect the autopilot,
- Retracts flaps before adding power,
- Improper pitch control resulting in excessive loss of altitude, stall entry, or both,
- Announces go-around before regaining aircraft control,
- Fails to keep the aircraft aligned and over the runway throughout the go-around and initial climb.

Approach and Landing Speeds

Approach Speeds	SR20	SR22	SR22 G5
100% Flaps	78 KIAS	80-85 KIAS	80-85 KIAS
50% Flaps	83 KIAS	85-90 KIAS	85-90 KIAS
0% Flaps	88 KIAS	90-95 KIAS	90-95 KIAS
Short-field (100% Flaps)	78 KIAS	77 KIAS	79 KIAS
50 ft Speed - V_{REF} (100% Flaps)	78 KIAS	77 KIAS	79 KIAS
Touch-down Speed	Slightly Above Stall Speed		
Max Demonstrated Crosswind	20 KIAS		21 KIAS

Normal Landing

Normal landings should be made with 100% flaps. Final approach speeds should be adjusted to account for gusts exceeding 10 KTS by adding half of the gust factor. Reduce power smoothly and begin slowing from the final approach speed at a time that allows an easy transition from final descent to round-out and flare with minimum floating or ballooning. Touch-downs should be made on the main wheels first at speeds slightly above stall. Gently lower the nose wheel after the mains are on the ground.

Instructor Notes

Normal landing proficiency should be developed before attempting more difficult landings, such as short-field, reduced flaps, and power-off landings. Place emphasis on precise airspeed control and touch-down accuracy even during normal landings.

Each landing should be brought to a full stop, allowing sufficient time to reconfigure and re-trim the aircraft for takeoff. To save time, conduct takeoff and landing practice at runways long enough for a stop and go. Eventually, short-field landing proficiency should be developed and assessed on a shorter runway.

The root causes of landing problems typically result from faulty approaches, and airspeed and/or power mismanagement. Pilots that are unable to control the aircraft precisely while in the traffic pattern or on final approach need more time handling the aircraft in slow flight. Emphasize airspeed control and small, accurate control inputs. Ensure pilots are trimming the aircraft for airspeed changes.

Pilots transitioning into the aircraft typically need experience to become familiar with the visual sight picture. Demonstrating the first landing while highlighting the proper sight picture can be an effective method for teaching proper round-out and flare attitudes. Also, highlight touchdown sight pictures while practicing slow flight.

Maintain defensive positions on rudder pedals, flight controls, and throttle during all takeoff and landing practice. Be in a position to take aircraft control immediately if an unsafe situation arises.

Always follow these procedures when landing a Cirrus aircraft:

- Use full flaps,
- Manage airspeed precisely,

- Manage power smoothly and precisely. ‘Chopping’ the throttle is not necessary for normal approaches to landing,
- Normal landing final approach speed for the SR20 and SR22 is 78 KIAS and 80 KIAS respectively, plus half the gust factor if applicable,
- Touch-down on the main landing gear at approximate stall speed,
- Trim for all airspeed changes,
- Initiate a go-around after one pilot-induced oscillation or significant bounce,
- Always touch-down within the first 1/3 of the runway; initiate a go-around if insufficient runway remains for stopping,
- Hold elevator back pressure after touchdown as airspeed decays.

Completion Standards

- Considers the wind conditions, landing surface, obstructions, and selects a suitable touch-down point within the first 1/3 of the runway,
- Establishes the aircraft approach and landing configuration and airspeed as recommended, and adjusts pitch and power as required,
- Maintains a stabilized approach and recommended airspeed +/- 5 KIAS with wind gust factor applied,
- Manages airspeed and power to minimize floating during round-out,
- Touches down smoothly at approximate stalling speed,
- Touches down at or within 400 feet beyond a specified point, with no drift, and with the airplane’s longitudinal axis aligned with and over the runway centerline,
- Maintains crosswind correction and directional control throughout the approach and landing sequence,
- Completes the Before Landing checklist,
- Uses brakes as required while maintaining directional control. Keeps the runway centerline between the main landing gear until reaching the desired turnoff point,

Common Errors

- Flares too high creating a stall to hard landing situation,
- Touches down 5 to 10 KIAS above stall speed causing a flat landing attitude and possible pilot-induced oscillation,
- Fails to keep the aircraft on the centerline throughout the landing roll,
- Fails to initiate a go-around for unsafe landing situations,
- Fails to continuously add back pressure to slow the aircraft during round-out into the flare,
- Relaxes elevator back pressure during flare to quickly after touch-down.

Short-Field Landing

Landings on short runways should be made with 100% flaps. Final approach speeds should be adjusted to account for wind gusts exceeding 10 KIAS by adding half the gust factor. Progressively reduce power after clearing all approach obstacles. Proper airspeed and power control should result in an approach with minimal floating in ground effect without excessive sink rates during the approach. Touch-down should be made on the main wheels first. Immediately after touch-down, ensure power is at idle, lower the nose wheel and apply brakes as required. To decrease stopping distances, consider retracting the flaps and holding the control yoke full aft. Emphasis should be placed on the accuracy of the touch-down to ensure enough runway remains after touch-down to stop the aircraft.

Instructor Notes

Pilots that can consistently demonstrate short-field landings within completion standards are typically good ‘stick and rudder’ pilots. They consistently demonstrate the ability to control airspeed effectively and have a good sense of how to manage the aircraft’s energy when approaching to land.

Requiring a pilot to perform landings on runways less than 3000 feet is a good measure of that pilot’s landing ability. However, a short runway may not always be readily available. Instructors must be creative when practicing short-field techniques on a runway that is not short. When practicing at a longer runway, use existing visible runway features to define a shorter runway, less than 3000 feet. Taxi-ways, runway stripes, or adjacent buildings make good landmarks. Ensure pilots are aware of the consequences of landing short or overrunning the ‘simulated’ short runway.

Short runways are typically narrower than longer runways. Therefore, it is highly beneficial for pilots to practice and demonstrate short-field landing skills at actual short-fields (2500 - 3000 feet) during private, transition, and recurrent training courses. Cirrus courses require cross-country legs; use the legs to branch out to airports that have smaller runways if possible.

Short-field landings should be performed to a full stop and usually require a back-taxi.

Pilots who lack the skills to perform short-field landings generally have energy management issues, stabilized approach issues, or issues with normal landings. In these cases, go back and hone normal landing skills, with increased emphasis on airspeed control and touch-down accuracy before continuing with actual short-field practice.

Completion Standards

- Adheres to applicable completion standards for normal landings,
- Touches down at or within 200 feet beyond a specified point, with no side drift, minimum float and with the airplane's longitudinal axis aligned with and over the runway center,
- Applies brakes and elevator control as necessary to stop in the shortest distance consistent with safety,
- Executes a go-around if sufficient runway for braking is not available.

Common Errors

- Selects and tracks to an aiming point that results in a touch-down beyond the desired landing point,
- Touches down before the specified touch-down point,
- Touches down 200 feet beyond the specified touch-down point,
- Fails to adjust approach angle to compensate for obstacles if applicable,
- Fails to recognize the need for a slip to landing for obstacle clearance purposes,
- Fails to adjust airspeed to the recommended short-field approach speed,
- Applies excessive braking causing undue brake wear or loss of directional control.

Soft-Field Landing

Cirrus aircraft are approved for landings on soft field and turf runways. Add 20% to the landing ground-roll distance when landing on a dry grass runway and 60% when landing on a wet grass runway. Always ensure that the quality and condition of the runway surface is adequate to support the aircraft. Avoid turf runways with long grass, wet or soggy soil, large ruts or holes. A soft field approach is quite similar to a normal landing approach. Touch-downs should be made on the main wheels first. A soft touch-down will reduce the stress on the landing gear and make it easier to keep the nose wheel from digging into the turf preventing a loss of directional control. Keep the nose wheel off the ground as long as possible by applying sufficient back pressure to the control yoke. A little power can be added immediately after touch-down to aid in keeping the nose wheel off the ground. Braking should be minimized. Excessive braking could lead to a loss of directional control on the runway. Higher power settings will be required to taxi on a soft field.

Instructor Notes

Pilots that indicate a need to takeoff and land at actual soft fields should practice soft field takeoff and landings at a real soft field during training. Plan cross-country legs or segments as necessary to add the soft field takeoff and landing practice.

Pilots with little or no experience with landing on a soft field generally have trouble flying a proper glidepath to the touch-down point and assessing height above touchdown. Practice and repetition is required to develop the pilot’s skills. It is also recommended to practice the soft field technique on a hard surface until it is mastered, then move to an actual soft field. The instructor should always demonstrate the first landing and/or takeoff to make the pilot more comfortable with the differences.

Emphasis should be placed on the takeoff and landing performance implications when conducting dry or wet grass landings.

Soft-field landings should always be completed to a full stop.

Completion Standards

- Adheres to applicable completion standards for normal and short-field landings,

- Touches down smoothly on the main landing gear and holds full elevator aft controls throughout the landing roll and taxi,
- Applies brakes only as required and maintains directional control without locking the brakes during the landing roll.

Common Errors

- Fails to accurately assess height above touch-down resulting in a flat, hard, or unsafe touch-down,
- Fails to touch-down accurately resulting in a runway over run situation,
- Fails to hold full elevator back pressure to reduce nose wheel pressure/fatigue,
- Fails to assess runway condition before attempting takeoff or landing,
- Fails to account for sunrise or sunset times when planning a flight out of, or into an unlit soft field runway.

Crosswind Landing

Crosswind landings should be made with 100% flaps. It is recommended to crab the aircraft into the wind sufficiently enough to track the aircraft along the extended centerline of the runway. Hold the crab until the beginning of the round-out. At the start of the round-out, enter a slip by applying rudder pressure to align the longitudinal axis of the aircraft with the runway and simultaneously apply aileron to keep the aircraft tracking the runway centerline. Touch-downs should be made on the upwind main landing gear first, followed by the downwind main landing gear, and nose gear. Hold aileron correction into the wind during the rollout and apply rudder as necessary to maintain directional control.

Instructor Notes

Select airports with runway configurations that have crosswinds during Cirrus courses. Develop normal landing proficiency, when possible, before introducing crosswind techniques. Require pilots to demonstrate crosswind proficiency for all types of landings: normal, short-field, soft field, and power-off as appropriate.

Pilots commonly neglect to develop crosswind personal limitations and end up in situations that require greater skill than they possess. Personal crosswind limitations should be based upon recent experience. After training, a pilot's personal crosswind limitation should be based upon the maximum crosswind to which the pilot has demonstrated proficiency. Pilots may increase their personal crosswind limitations incrementally through training and experience.

Conducting low passes over the runway at approximately 20 feet and 75 - 80 KIAS while holding crosswind control inputs is an effective way to develop crosswind proficiency. Landings may be attempted after the pilot demonstrates the ability to align the longitudinal axis of the aircraft with the runway and track over the runway centerline without drift. Also, practice applying and reducing crosswind inputs at a safe maneuvering altitude at approach to landing speeds until the pilot is capable of applying inputs smoothly and accurately.

Completion Standards

- Adheres to applicable completion standards for normal, short-field, and soft field landings,
- Identifies need for crosswind technique,

- Smoothly applies rudder and aileron inputs to align the longitudinal axis of the aircraft with the runway over the runway centerline with no drift as the aircraft enters the round-out phase of landing,
- Holds aileron crosswind control inputs after touch-down and through the landing roll,
- Identifies crosswind conditions that exceed the pilot's capabilities and develops alternative plans for safe landing,
- Selects 100% flaps.

Common Errors

- Applying excessive control inputs resulting in uncoordinated flight,
- Fails to hold ailerons into the wind after touch-down with no drift,
- Touches down with drift,
- Fails to recognize an unsafe crosswind situation and fails to select a more suitable landing runway,
- Develops marginal crosswind proficiency on a long and wide runway. Pilot then assumes he or she will be proficient on shorter and narrower runways.

Reduced Flap Landings (0% and 50%)

While most landings in Cirrus aircraft are performed with 100% flaps, it is important for pilots to develop proficiency landing with 50% or 0% flaps. Landing with less than 100% flaps should be considered a non-typical situation requiring a heightened sense of awareness and caution. Final approach speeds are increased by 5 KIAS for 50% flap and 10 KIAS for 0% flap landings due to the increased stall speed with reduced flap deflection. A slightly larger traffic pattern will be required to descend the aircraft on an approximately 3 degree glidepath to the runway without excessively high descent rates.

Pilots must also be aware that the aircraft will be at a higher angle of attack as compared to a landing with full flaps on final approach and during touch-down. Pilots are cautioned to not exceed 10 degrees of nose high pitch during the round-out and flare to prevent a tail strike. Landing distances with reduced flaps will be greater due to increased final approach and touch-down speeds.

Pilots landing from an instrument approach procedure may elect to land with approach flaps (50%) if changing flap configuration on short final will create an unstabilized approach. Increase final approach speed and ensure adequate runway remains for safe stopping.

Instructor Notes

Reduced flap landings should be practiced once the pilot has demonstrated proficiency performing normal and short-field landings. A zero flap landing can be tied to a flap malfunction scenario; see the flap malfunction section for more information about scenario set up.

Instructors are encouraged to demonstrate a reduced flap landing before allowing the pilot to attempt them. Highlight the differences in traffic pattern, speed differences, and correct angle of attack during the touchdown while demonstrating the landing to the pilot.

Closely guard the flight controls to prevent the pilot from over-flaring the aircraft into an excessive nose high attitude during round-out or flare.

To demonstrate an excessive pitch angle, park the aircraft on a level surface with the engine shut down, the avionics on, and AHRS aligned. Have two or more people apply pressure to the root of the horizontal stabilizer to gently lower the tail to the ground. With the pilot seat adjusted to normal flight position, the pilot will be able to see the outside references of an excessive flare attitude that will induce a tail strike.

Completion Standards

- Adheres to applicable completion standards for normal, short-field, and/or crosswind landings,
- Selects a runway with adequate distance,
- Adjusts final approach speed as required,
- Adjusts traffic pattern as necessary for a stabilized approach,
- Does not flare the aircraft excessively during round-out and flare.

Common Errors

- Fails to select a runway with adequate distance,
- Overshoots desired touch-down point excessively,
- Over rotates the aircraft during round-out or flare,
- Fails to adjust traffic pattern for reduced flap landing,
- Elects to land with 50% flaps in crosswind conditions when normal procedure calls for 100%.

Icing Landing Procedure

1. ICE PROTECT System Switch...On

   It is important to ensure the switch has been set to the intended position. This is especially true for night operations.

2. ICE PROTECT Mode Switch...........................HIGH / As Required

   HIGH should be selected initially. If ice accumulation rate is low, select NORM. If ice does not shed, select MAX and perform the Anti-ice System Failure checklist.

3. WIND SHLD Push-Button ....Press As Required

   Use the windshield ice protection when residual fluid that is slung from the propeller will not keep the windshield free of ice.

   • Caution •

   To prevent an obstructed view due to residual anti-ice fluid on windshield, do not operate windshield ice system within 30 seconds of landing.

4. Ice Inspection Lights ....As Required

   Ice inspection lights will illuminate the leading edges of the wings and horizontal stabilizer in order to monitor ice accumulation and confirm fluid flow at night.

5. Flaps 50%

   Approaches and landings in icing conditions or with ice adhering to the aircraft should be made with 50% flaps. Extending flaps to 100% in icing conditions can reduce the effectiveness of the elevator and horizontal stabilizer and could potentially lead to a tail stall.

6. Airspeed...Minimum of 95 KIAS

   Residual ice on the protected areas and ice accumulation on the unprotected areas of the airplane can cause an increase in stall speed even with the anti-ice system operating. Refer to the Stall Speeds with 45 Minute Ice Accumulation chart in the TKS Anti-ice System supplement.

7. Airspeed on Short Final ....88 KIAS

   Airspeed should be no less than 88 KIAS if icing conditions exist or with ice adhering to the airframe due to the possibility of an increased stall speed.

Instructor Notes

Pilots transitioning into a Cirrus equipped with the FIKI system need to develop proficiency performing the icing landing procedure. Awareness of when to use the procedure needs to be highlighted in the training. At first, practice the procedure until the aircraft can be landed safely. This procedure may be combined with the 50% flap landings required by the transition syllabus.

Later in the training, verbally announce to the pilot that ice is adhering to the airframe. Proficient and cognizant pilots will automatically select and perform an icing landing procedure. Presenting an airframe ice scenario when planning to land at a short runway is also a good way to assess the pilot's decision making process. Pilots should change their landing plans, if necessary, to land at a suitable runway.

Completion Standards

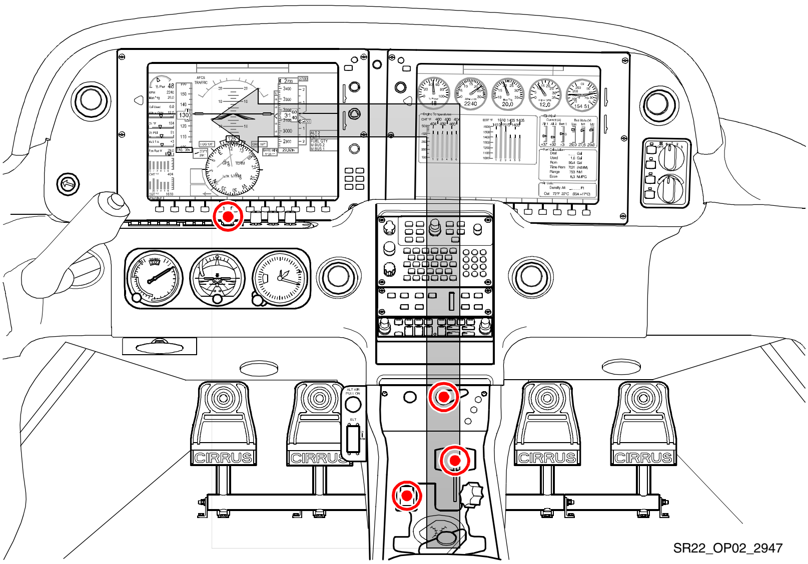
- Adheres to applicable completion standards for normal and short-field landings,
- Identifies the need, actual or simulated by the instructor, to perform the icing landing procedure,
- Selects a runway with adequate landing distance to perform the icing landing procedure considering landing distances and ground roll published in the TKS Anti-Ice Supplement.

Common Errors

- Fails to identify the need for the icing landing procedure,
- Neglects to assess the landing distance performance implications of the icing landing procedure,
- Lands with over-rotation causing a tail strike.

After Landing

Complete the After Landing checklist as a flow after clearing the active runway. Ensure the pitot heat is turned off. The mixture can be leaned if desired. Set the mixture by leaning for max RPM rise.



After Landing Flow

Procedure (Flow Pattern)

1. Power Lever .... 1000 RPM

   Reduce power to 1000 RPM during taxi. Changes in engine speed should be used to accelerate or decelerate the aircraft along with minimal braking as necessary.

2. Fuel Pump.. OFF

   Select Fuel Pump OFF after clearing runway.

3. Mixture (SR22TN/SR22T) .... LEAN

   Lean the mixture for maximum RPM rise.

   It is acceptable to lean the SR20 and SR22 using the same procedure described above for high altitude operations or if spark plug fouling is suspected.

4. Flaps .... UP

   Select flaps to 0% (UP) after clearing runway.

5. Transponder ....STBY

   Ensure transponder has automatically cycled to STBY. If not, select STBY manually unless directed by ATC.

6. Lights .... AS REQUIRED

   Reduce external lighting once clearing the runway to the minimum required for safe/legal operation so as to avoid creating a hazard to others.

7. Pitot Heat ....OFF

   Select Pitot Heat OFF.

8. Ice Protection System ....OFF

   Select Ice Protection System OFF if used for landing.

Instructor Notes

Pilots should always clear the active runway and come to a complete stop before dividing attention to complete the After Landing checklist items. It is very common for pilots to continue to taxi without completing items or to complete items during the landing roll or during the taxi. Both of these behaviors are unacceptable and more emphasis should be placed on proper checklist procedures. Emphasizing the correct procedures early in training will help develop better habits.

Completion Standards

- Completes the after landing checklist procedure after clearing the active runway,
- (FIKI) Turns pitot heat off within 45 seconds after landing.

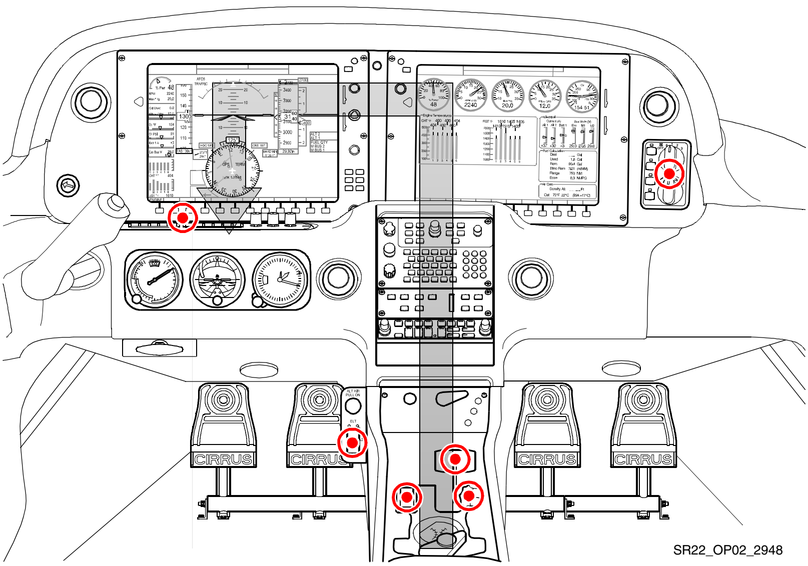
Common Errors

- Completes checklist items during landing ground roll, before clearing the active runway, or during taxi,
- Neglects to complete checklist items and/or reference the checklist after landing.

Arrival and Engine Shutdown

Complete the Shutdown checklist as a flow pattern. Verify with the checklist to ensure all items have been accomplished when completed with the flow. The avionics switch may be left on during engine shutdown. Notify maintenance personnel immediately and do not move the propeller if a hot magneto is found during the shutdown process.

The aircraft should be parked on a ramp or in a hangar. If the aircraft is parked outside, it should be chocked and tied down if possible.



Arrival/Engine Shutdown Flow

Procedure (Flow Pattern)

1. Fuel Pump (if used) .... OFF
2. Throttle .... IDLE
3. Ignition Switch .... CYCLE

• Caution •

Note that the engine hesitates as the switch cycles through the OFF position. If the engine does not hesitate, one or both magnetos are not grounded. Prominently mark the propeller as being HOT, and contact maintenance personnel immediately.

4. Mixture ....CUTOFF

   Reduce mixture control to the full CUTOFF position and ensure engine stops running. If the engine continues to run with the mixture at idle, ensure the boost pump is in the OFF position.

5. All Switches ....OFF

   Turn off all remaining switches including the air conditioning and fan if equipped.

6. Magnetos ....OFF

   Turn off magnetos and remove key.

7. ELT.. TRANSMIT LIGHT OUT

   After a hard landing, the ELT may be activated. If this is suspected, press the RESET button located below the circuit breaker panel near the floor by the pilot's right ankle.

8. Chocks, Tie-downs, Pitot Cover............................ AS REQUIRED

   Set parking brake if required, chock both main wheels, use tie downs under wings and tail if necessary. Place pitot cover and static covers if needed.

Instructor Notes

Pilots often become concerned with post flight responsibilities and/or non-flight-related concerns after landing. It is important to teach that the flight is not over until the aircraft is completely secured. Ensure proper checklist procedures are being followed and good routines are developed for each shutdown and post flight.

A quick post flight walk around is recommended after each flight to ensure any abnormalities are identified and resolved before the next flight. Pay attention to brake temperature stickers, wheel pant condition, and evidence of leaking brake fluid, fuel, or oil under the aircraft.

Completion Standards

- Completes shutdown checklist as described.

Common Errors

- Fails to reference and follow the shutdown checklist procedure,

- Fails to turn the A/C or fan to the off position,
- Fails to turn the magnetos off,
- Fails to replace the CAPS pin during post flight.

Section 4
Emergency & Abnormal Procedures

General

Sections 3 and 3A of the Pilot's Operating Handbook provide the procedures for handling emergency and abnormal system and/or flight conditions which, if followed, will maintain an acceptable level of airworthiness and reduce operational risk. The guidelines described in these sections are to be used when an emergency or abnormal condition exists and should be considered and applied as necessary.

This section does not reference all emergency and abnormal procedures that are described in the Pilot's Operating Handbook. Reference this section for expanded guidelines on the selected procedures and cockpit flow diagrams for emergency procedure memory items.

The procedures described in this section are commonly practiced during flight training as a means to develop and assess a pilot's system and procedural knowledge and his or her ability to make correct decisions regarding the failure or emergency situation. Completion standards are provided for pilots and instructors when assessing performance. Reference the Common Errors sections to anticipate typical errors made by pilots when practicing these procedures.

Instructor Responsibilities

Pilots must be capable of performing emergency and abnormal procedures while maintaining aircraft control and to make decisions that lead to a safe outcome without excessive risk. Emergency and abnormal procedures training is provided to pilots learning to fly new aircraft, conducting recurrent training, or conducting training for an additional certificate or rating.

Instructional flights inherently have higher risk than normal, point-to-point flights. Repetitive maneuvering to develop new pilot skills and practicing emergency and abnormal procedures increases the probability of an accident or incident. The additional risk during training is mitigated by the instructor with the strategies detailed below. It is the instructor's responsibility to assess the unique circumstances of each training event and conduct flight training with a high level of safety. An accident caused by pilot error while conducting flight training is unacceptable.

- The instructor is pilot-in-command and has the authority to discontinue the flight or maneuver when necessary,
- Limit emergency and abnormal procedure training to VFR weather in airspace and terrain that provides sufficient room for maneuvering or pilot error,
- Conduct emergency and abnormal procedure training in a flight training device or simulator when possible,
- Follow the guidelines in this section concerning maneuver limitations and scenario setup recommendations,
- Take control of the aircraft any time an immediate safety-of-flight threat arises,
- Maintain defensive positions on flight controls, rudder pedals, and power lever during critical phases of flight or when conducting emergency and abnormal procedure training,
- Do not create a real emergency by setting up a simulated emergency improperly,
- Develop fundamental skills such as: systems knowledge, checklist flow patterns, memory items, before introducing scenarios that require higher level decision-making abilities.

System Malfunctions

System malfunctions presented during training provide an opportunity for the instructor to assess the pilot's knowledge of the system and ability to manage risks associated with the failure. It is not feasible to practice every failure that is possible in the aircraft, nor is it always necessary. Focus on key failures, ones that have higher probability or greater severity, during training. Reference the Cirrus Syllabus Suite for guidance during transition training.

The objective of practicing failures has two parts. First, to develop the pilot's knowledge and skill required to deal with the specific system failure or emergency situation. Second, in doing the first correctly the pilot will learn how to properly handle other failures or emergency situations that may arise. The latter can be tested by presenting the pilot with a system failure that was not previously rehearsed on a final evaluation flight. Look for the following pilot actions when assessing the pilot's ability to handle emergency or abnormal situations:

- The pilot maintains aircraft control throughout the entire emergency or abnormal procedure. Autopilot usage, if available, can be a useful tool for single pilots dealing with emergencies. However, this may not be appropriate or available under some circumstances,
- The pilot identifies and correctly analyzes the emergency or abnormal situation,
- For emergencies, the pilot assertively completes the appropriate checklist memory items and references the checklist if workload permits,
- For abnormal procedures, the pilot selects the correct checklist and completes the items as a do-list,
- The pilot exercises sound aeronautical decision making skills and determines the best course of action considering all the information available.

Guidance on Pulling Circuit Breakers

Presenting system failures that mimic “real life” behavior creates realism and increases training effectiveness. Pulling circuit breakers to simulate system failures creates a high level of failure fidelity but should be done cautiously. It is the instructor’s responsibility to ensure the remainder of the flight can be carried out safely with the ‘popped’ breaker.

• Caution •

> Under no circumstances should any integrated avionics-related circuit breaker be pulled to simulate an instrument failure if visual flight cannot be maintained through landing.

The life cycles of circuit breakers in Cirrus aircraft are as follows:

- 2500 cycles for inductive load (most motors, pumps and fans)
- 5000 cycles for resistive load (most avionics equipment)

It is highly unlikely that these cycle limits will ever be reached, even in aircraft that are used specifically for training. For this reason, the theory of wearing out a circuit breaker prematurely is not backed by certification data. If the cycle limit is reached, follow the guidance in the maintenance manual for replacement.

It is often possible to pull the circuit breaker without the pilot being aware, which increases the realism of the scenario. Do this by increasing the workload of the pilot by assigning various avionics-related tasks. Once the pilot is occupied, tell him or her that something peculiar was noticed and that the circuit breaker panel needs to be checked. Reach over and pull the breaker while you are ‘investigating’ the situation. Or, transition into this failure at the conclusion of another failure that required a circuit breaker to be pulled and reset. For example, have the pilot pull the AHRS 1 and 2 circuit breakers and practice some partial panel BAIF. Once finished with the partial panel BAIF, reach over to restore the “popped” circuit breakers and pull an alternator circuit breaker.

Checklist Usage for Abnormal Procedures

Completion of abnormal procedures should be done using the do-list method. The appropriate checklist should be directly referred to and each item should be completed in the order prescribed.

Instructors should teach pilots to call up the appropriate checklist upon recognizing the abnormal situation or system failure.

Checklist Usage for Emergency Procedures

Emergency checklists should be completed from memory. The Emergency Procedures section of the POH identifies checklist items for emergency procedures that must be memorized. Execution of these procedures is considered time critical and is done without reference to a checklist. The checklist should only be referenced during an emergency if workload permits. Reference the emergency procedure flow patterns when practicing the completion of memory items.

Practice emergency checklist procedures in the cockpit while on the ground until the procedure can be accomplished in a timely manner.

Pilots are encouraged to practice emergency checklist procedures often. This can be accomplished on their own during periods of low workload in flight.

CAPS Deployment

The Cirrus Airframe Parachute System (CAPS) is a unique safety feature installed in all Cirrus aircraft. CAPS provides a level of protection to the pilot and passengers that is not common to most general aviation aircraft today. However, for CAPS to work, it must be manually activated by the pilot or a passenger at a safe altitude.

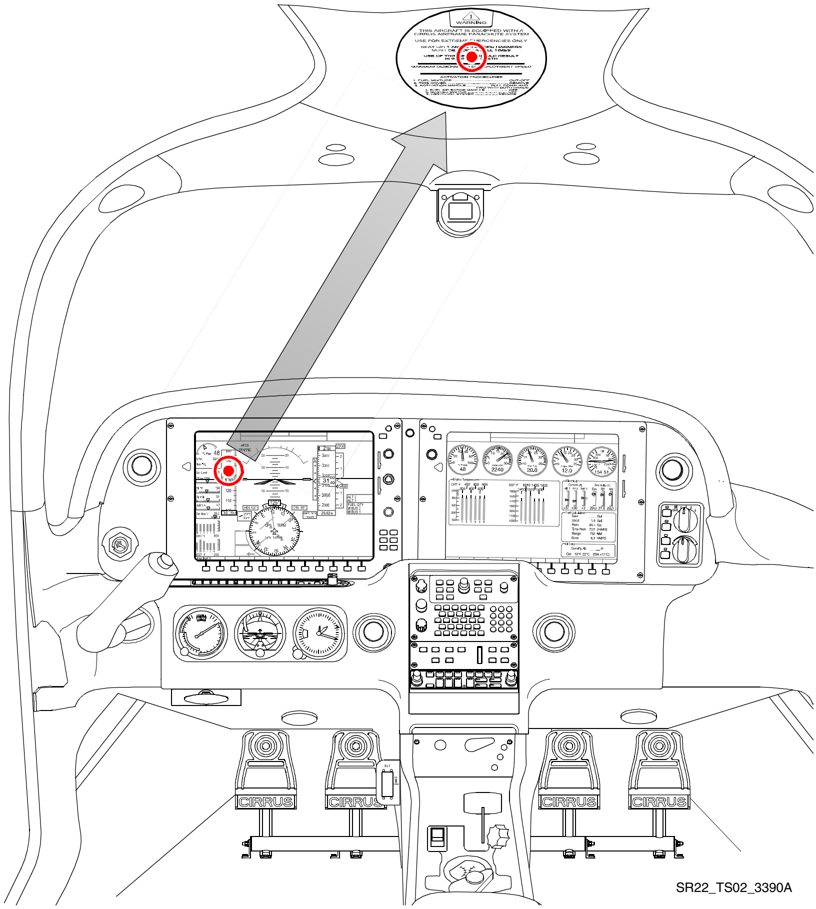
No minimum altitude for deployment has been set. This is because the actual altitude loss during a particular deployment depends upon the airplane's airspeed, altitude, and attitude at deployment as well as other environmental factors. In most cases, however, the chances of a successful deployment increases with altitude. As a data point, altitude loss from level flight deployments has been demonstrated at less than 400 feet, (561 feet G5), and altitude loss from spin deployments has been demonstrated at less than 920 feet, (1081 feet G5). If circumstances permit, it is advisable to activate the CAPS at or above 2,000 feet AGL.

The circumstances and decisions to use CAPS may or may not be readily apparent. The situations when CAPS should be considered will always be an emergency or pending emergency. The pilot must assess the risk of continued flight considering all known factors and determine the likelihood of a safe outcome. Whenever the safe outcome of a flight is in question and there is high risk of severe injury or death, CAPS should be used.

Pilots may encounter situations that require an immediate activation of CAPS such as: an engine failure after takeoff, mid-air collision, spin, or a loss of control in flight. CAPS must be activated quickly under these circumstances to preserve altitude and control airspeed within acceptable deployment parameters. Pre-briefing these circumstances often will help the pilot to react quickly and activate CAPS in a timely manner, increasing the probability of CAPS working properly. It is also important to note that CAPS has been activated by pilots at speeds in excess of 180 knots on multiple occasions with successful outcomes. Always keep in mind the best speed to activate CAPS is below Vpd if able.

Emergency situations in an aircraft are always stressful and pilots may overlook all available options for surviving the emergency. Pilots who regularly conduct CAPS training and think about using CAPS will often have a higher probability of deploying CAPS when necessary.

Performing CAPS training in a Cirrus flight training device or simulator is highly recommended. Visit www.cirrusaircraft.com to find an interactive map displaying Cirrus Simulator Centers. It is also recommended that frequent flying passengers complete CAPS training in a Cirrus simulator to develop the ability to properly activate CAPS.



CAPS Deployment

Procedure

The maximum demonstrated deployment speed during testing is 140 KIAS for the SR22 G5 or 133 KIAS for all other models. CAPS must be activated quickly when aircraft control is lost and airspeed is increasing.

1. Activation Handle Cover..REMOVE
2. Activation Handle (Both Hands)..............PULL STRAIGHT DOWN

Approximately 45 lbs of force is required to active CAPS. Pull the handle with both hands in a chin-up style pull until the handle is fully extended.

After Deployment:

3. Mixture .... CUTOFF
4. Fuel Selector..OFF
5. Bat-Alt Master Switches...OFF

   If time permits, declare the emergency and announce CAPS activation prior to turning off the Bat and Alt switches.

6. Ignition Switch..OFF
7. Fuel Pump..OFF
8. ELT .... ON
9. Seat Belts and Harnesses .... TIGHTEN
10. Loose Items .... SECURE
11. Assume emergency landing body position.

    Reference the passenger briefing card for the correct emergency landing body position. Be mindful of airbag seat belts if installed.

12. After the airplane comes to a complete stop, evacuate quickly and move upwind.

    In high winds the parachute may inflate and drag the aircraft after touchdown. Remain upwind of the aircraft.

Instructor Notes

All Cirrus aircraft are equipped with the Cirrus Airframe Parachute System (CAPS). Pilots learning to fly a Cirrus aircraft require specific training on the proper use of the CAPS system.

The decision to deploy CAPS is the ultimate risk management exercise, similar to the decision to activate an ejection seat. The decision to deploy CAPS should never be taken lightly, but should be used in all warranted situations. Proper training will increase the likelihood of a successful and correct CAPS deployment should a real-life emergency arise.

CAPS training should be presented in three phases: knowledge and attitude, muscle memory, and decision making. First, pilots must receive ground training highlighting basic CAPS philosophy and knowledge to help change the pilot's attitude towards CAPS. The use of power points and videos are effective tools to educate the pilot. Before the pilot gets into the airplane, the pilot must have the mind-set that they would use CAPS during an emergency when appropriate.

Second, pilots must be able to correctly and quickly deploy the parachute and prepare the aircraft and occupants for touchdown after deployment. This is accomplished through briefing and rehearsal to develop muscle memory coordination to perform the deployment sequence. A simulator or flight training device is the most useful tool to develop these skill sets.

When training in the aircraft, have the pilot remove the CAPS placard and touch the handle to simulate deployment.

• Caution •

> Under no circumstances during a **simulated** CAPS deployment should the CAPS handle be removed from the sleeve.

Third, the pilot should be presented with scenarios that lead to a decision to simulate a CAPS deployment. Such situations should be briefed on the ground and practiced in a flight scenario. It takes a very well-crafted scenario to lead a pilot to a CAPS deployment decision in flight. To help the pilot pull CAPS at an appropriate altitude special emphasis should be placed upon the pilot that they maintain altitude awareness during the scenarios. Here are some scenario suggestions when conducting CAPS training in the aircraft.

<u>Scenario 1- Engine failure over an unprepared surface</u>

Announce to the pilot that the oil pressure is steadily dropping and the engine is starting to vibrate. Then reduce the power to idle and announce the engine has failed. The pilot will need to decide to land or to use CAPS. The pilot should choose CAPS instead of attempting a landing onto an unprepared surface.

<u>Scenario 2- Engine failure in simulated instrument conditions.</u>

It is often effective to do this over an airport within glide range. Announce to the pilot that ceilings are reported at 1000 feet AGL. This requires the pilot to choose between CAPS or an attempted power-off landing. Another useful time to simulate an engine failure in IMC is after the pilot has climbed to altitude after a missed approach. The need for the pilot to go missed implies the weather is below minimums at the nearest airport. The pilot must maintain situational awareness while in IMC to pull CAPS at an appropriate altitude.

<u>Scenario 3- Severe icing encounter.</u>

Announce to the student ice is starting to accumulate on the leading edges of the wings. Limit and reduce the maximum available power to simulate performance degradation. Eventually, limit power so that level flight cannot be maintained.

Scenario 4- Engine failure over a small runway (less than 3,000ft).

This scenario is useful in that you, the instructor, can see how the pilot's decision making has progressed. Most pilots will think that a power off landing into the small runway is the only option. At any point before 1,000 feet AGL that the power off landing is in doubt, the pilot should use CAPS. CAPS is more likely to provide a survivable outcome than an attempted landing into a small runway with little margin for error.

Scenario 5- Engine failure on takeoff (above 500 ft AGL)

During takeoff, after climbing through 500ft AGL verbally announce that the engine has failed. Have the student announce what they would do. If not enough runway remains they should announce their decision to deploy CAPS. Never reduce engine power to simulate an engine failure during takeoff.

Scenario 6- Mid-air collision

As the instructor, this scenario must be exercised with great care and at an altitude that will allow for recovery above 1,500 feet AGL. Announce to the student that another airplane has collided with the right wing, causing damage to the wing tip. Apply pressure to the side stick resulting in an increasing right bank. Do not let the bank exceed 60 degrees during the demonstration. A bird strike scenario can be used instead of a mid-air collision if desired.

Scenario 7- Loss of Control

Many fatal airplane accidents are due to a loss of control situation. This scenario can be incorporated into IFR training or unusual attitude recovery training when the student is wearing a view limiting device. Disable the standby attitude indicator by pulling both circuit breakers. Then dim the PFD Screen to take away all instruments. Do not allow the use of reversionary mode, leaving the standby airspeed indicator, altimeter, and compass operational. Eventually the standby attitude indicator will stop working correctly, causing the student to lose control of the airplane. Most likely the student will attempt to keep trying to fly the airplane, but the goal of this scenario is to have the student use CAPS in a timely manner after a loss of control situation.

Using a simulator or flight training device allows for more CAPS deployment scenarios in a safe, realistic, controlled environment such as:

- Engine failures shortly after takeoff,
- Loss of control due to control system failure, severe turbulence, or,
- Structural failure due to severe turbulence, midair collisions, or a bird strike,
- Realistic icing scenarios,
- Engine fire in flight with no suitable airports nearby to land at,
- Other emergencies simulated in IMC.

After the pilot decides to activate CAPS, ensure the pilot goes through the appropriate post-deployment procedures and secures the cabin, briefs the passengers, and prepares for touchdown. The pilot should assume the emergency landing body position, tighten the seat belt and shoulder harness, both hands on the lap, clasping one wrist with the opposite hand, and holding the upper torso erect and against the seat backs. It is recommended that the instructor take control of the aircraft allowing the pilot to finish the post CAPS deployment procedures.

Completion Standards

- Maintains situational awareness during the scenario and makes appropriate decisions,
- Recognizes the need to use CAPS by an appropriate altitude,
- If not in a loss of control situation, and if time and altitude permits, slows the airplane below Vpd
- If in a loss of control situation immediately uses CAPS,
- Simulates the recommended procedure for pulling CAPS,
- Simulates the post deployment procedures time permitting and secures the cabin,
- Identified the correct emergency landing body position,
- Recognized the most appropriate door position during touchdown considering outside factors.

Common Errors

- Fails to maintain situational awareness during the scenario,
- Descends below an appropriate altitude to deploy CAPS,
- Failure to slow below Vpd, when time and altitude permits,

- Failure to complete the post deployment CAPS procedures to secure the cabin,
- Failure to assume the emergency landing body position before ground impact.

Emergency Descent

There are multiple situations that require the use of an emergency descent. For example, fire, medical emergency, or an O_2 malfunction are just a few. Whatever the reason, the main purpose of performing an emergency descent is to lose altitude as quickly as possible to avoid life-threatening hazards. For some scenarios, landing the aircraft at an airport or suitable off-airport landing site or deploying CAPS may be an additional objective.

To enter an emergency descent, reduce the power to idle and lower the nose approximately 10 - 15 degrees to intercept $V_{NE.}$ Pitch the aircraft to V_{NO} if significant turbulence is expected during the descent.

Banking the aircraft to 45 degrees will help the aircraft accelerate more quickly as well as keep loading positive during the maneuver. It is recommended to bank the aircraft to 45 degrees until heading 90 degrees from the previous heading. From there, adjust heading as necessary for terrain, traffic, and/or a diversion airport.

Set the mixture control as recommended below and turn the boost pump on. Clear the engine every 1000 feet by increasing MP to 15 inches, then reducing back to idle. The combination of high airspeed and low power will cause CHTs to cool. It is good practice to allow the engine to warm before applying high power settings. When possible restore power to minimum necessary for level flight until CHTs return to green.

Inform ATC of the emergency and intended actions and request any assistance if necessary when workload permits.

Training Limitations

- Complete maneuver in VMC,
- Complete maneuver under VFR unless ATC authorization is obtained,
- Complete maneuver in class E or G airspace unless prior authorization is obtained from the controlling agency,
- SR22T- maintain at least 15” MP above 18,000 feet.

Procedure - Instructor

1. Clear the area visually and with traffic alert system if available,
2. Initiate simulated Engine Fire in Flight or,

3. Initiate simulated O_2 malfunction at high altitude,
4. Guard mixture and fuel selector controls,
5. Announce a target airspeed of V_{NO},
6. Guard flight controls to prevent an overspeed.

Procedure

1. Power Lever .... IDLE
2. Mixture .... AS REQUIRED,
    - SR20 - full rich,
    - SR22 - top of green fuel flow arc,
    - SR22TN - full rich,
    - SR22T - full rich.
3. Airspeed .... V_{NE}

    Decrease pitch to 10 - 15 degrees to intercept V_{NE}. Maintain V_{NO} if turbulence is expected.

Recovery (Training)

- Continue to land if a stabilized approach can be maintained to a suitable runway, or
- Increase pitch to slow the aircraft, level the descent, and
- Increase power to minimum required for level flight at 100 KIAS until CHTs are within the green arc.

Instructor Notes

Pilots often require practice and repetition to perform an emergency descent properly while maintaining positive aircraft control throughout the procedure. Have the pilot develop the skills to perform an emergency descent before providing scenarios that require a decision to perform them.

Pilots flying IFR must notify ATC, when workload permits, of the clearance deviation and to declare an emergency. Have pilots announce intentions to the instructor when practicing. IFR pilots should practice emergency descents in VMC and simulated IMC.

When practicing an emergency descent due to an engine fire, be sure to guard the mixture control and fuel selector switch to prevent the pilot from actually shutting the engine down. An emergency descent should be initiated shortly after the memory items for an Engine Fire In Flight are completed.

When simulating an engine fire in flight, turn the boost pump to low boost once the emergency descent is initiated and inform the pilot that the boost pump must remain in the off position in a real engine fire scenario. Place the mixture setting as described in the Emergency Descent checklist procedure in the respective AFM. Practice the maneuver at V_{NO} to prevent an over speed situation. Use V_{NE} for actual fires in flight.

Completion Standards

- Promptly recognizes the need for an emergency descent and enters the maneuver,
- Banks aircraft to 45 degrees during the start of the maneuver to load the aircraft and increase descent rate,
- Maintains airspeed +0/-5 KIAS of target airspeed for maneuver,
- Determines the best course of action considering the nature of the emergency.

Common Errors

- Fails to reduce pitch sufficiently to accelerate to the desired airspeed,
- Overspeeds the aircraft beyond V_{NE},
- Fails to manage airspeed and altitude properly to execute a stabilized approach to landing,
- Fails to consider deploying CAPS at an appropriate altitude.

Engine Malfunctions Overview

Proper pre-flight inspections, operating as per AFM recommendations, and routine maintenance all reduce the likelihood of an in-flight engine malfunction. Although engine malfunctions are a rare occurrence, pilots must be capable of properly identifying and troubleshooting while maintaining aircraft control.

Pilots are encouraged to actively scan engine instrumentation during flight to preemptively fend off or identify up and coming failures. Pay close attention to oil pressure and CHT status and trends.

Most engine malfunctions should be treated as emergencies. Pilots should be familiar with emergency procedure memory items and be capable of completing memory items in a timely fashion. Practice completing emergency procedure memory items during recurrent training and while sitting stationary in the aircraft.

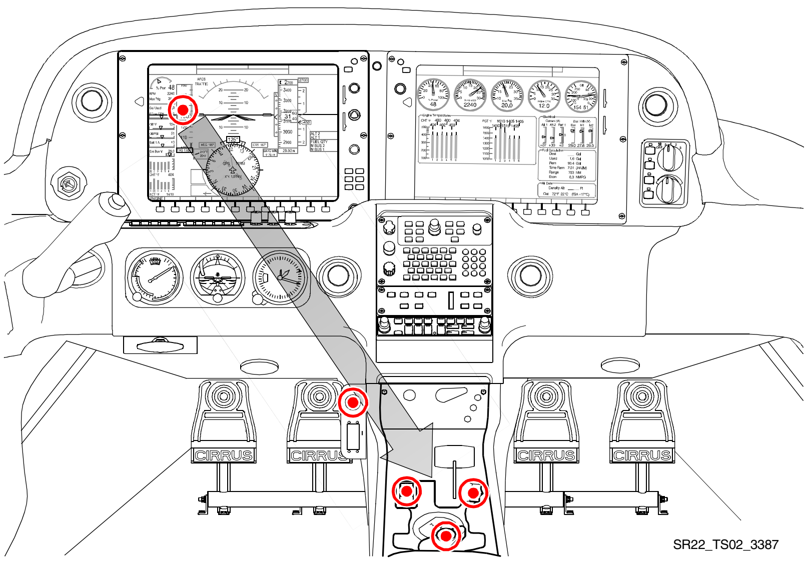
Training Limitations

- Simulated engine failures on takeoff and power-off return to airport during departure / climb maneuvers are not permitted,
- Simulated engine failures are not permitted in actual IMC or when VMC cannot be maintained,
- Ensure the aircraft is in a position to make an airport landing or landing at a suitable off-airport site when conducting these maneuvers in case a real emergency is encountered during the simulated emergency practice.

Engine Failure In Flight

Fuel starvation is a major cause of engine failures in-flight. Neglecting to switch fuel tanks or attempting flight beyond fuel reserves are major contributing factors. Pilots are encouraged to program a scheduled message as a reminder to check the fuel balance every 30 minutes. Proper pre-flight planning and ensuring sufficient fuel reserves considering current or changing weather conditions for every flight is critical.

If time and workload permit, complete the Engine Air-start checklist in attempt to regain engine power. Proceed to the Emergency Landing Without Engine Power checklist if the engine fails to restart.



Engine Failure In Flight

Procedure (SR20, SR22)

1. At or above 1000 feet AGL and below 18,000 feet MSL, reduce throttle to idle and verbally announce the engine failure,
2. Clear engine every 1000 feet by increasing MP to 15”.
3. <u>Best Glide Speed...ESTABLISHED</u>

   Pitch to maintain altitude until the airspeed reaches best glide speed, then pitch down to maintain best glide speed.

4. Mixture .... AS REQUIRED

   Lean or enrichen the mixture in effort to supply the engine with a combustible fuel-air ratio. Use a smooth but prompt sweeping motion to re-initiate combustion.

5. Fuel Selector .... SWITCH TANKS

   The engine should start shortly after switching fuel tanks if the cause of the engine failure was due to fuel starvation. Be mindful of maximum fuel imbalances and fuel reserves required to complete the flight.

6. Fuel Pump .... BOOST

   Turning the boost pump on will help suppress vapors that may be in the fuel lines and/or increase fuel pressure to the injectors. The engine will not run on the electric boost pump alone.

7. Alternate Induction Air .... ON

   Press the center button on the alternate static source when pulling the alternate induction air control knob.

8. Ignition Switch .... CHECK, BOTH

   Switch between the left and right magnetos. Leave the ignition on the magneto that causes the engine to fire for the remainder of the flight.

9. If engine does not start, proceed to CAPS Deployment or Forced Landing Checklist, as required.

Procedure (SR22T and TN)

1. At or above 1000 feet AGL, reduce throttle to idle and verbally announce the engine failure,
2. Clear engine every 1000 feet by increasing MP to 15”.
3. Best Glide Speed .... ESTABLISH

   Pitch to maintain altitude until the airspeed reaches best glide speed, then pitch down to maintain best glide speed.
4. Fuel Selector .... SWITCH TANKS

   The engine should start shortly after switching fuel tanks if the cause of the engine failure was due to fuel starvation.
5. Ignition Switch .... CHECK, BOTH

   Switch between the left and right magnetos. Leave the ignition on the magneto that causes the engine to fire for the remainder of the flight.
6. Fuel Pump .... BOOST

   Turning the boost pump on will help suppress vapors that may be in the fuel lines and/or increase fuel pressure to the injectors. The engine will not run solely on the electric boost pump if the mechanical pump fails. High boost may be required above FL180 for vapor suppression.
7. Power Lever .... 1/2 OPEN

   Set the power lever to half open before adjusting the mixture control. If the engine fires, make future power changes cautiously. Return the throttle to a running position if the engine fails during future throttle movements.
8. Mixture ...... IDLE CUTOFF, then slowly advance until engine starts
9. Perform Caps Deployment or Emergency Landing Without Engine Power checklist, as required.

   If engine Starts:
10. CHTs and Oil Temperature ... VERIFY within GREEN range, warm engine at partial power if required

Recovery (Training)

- If the pilot simulates a CAPS deployment, take aircraft control while the pilot conducts post deployment activities or,

- Initiate a go-around procedure at 500 feet AGL, or higher if required by regulation or safety, when a stabilized approach to landing at an airport cannot be conducted or,
- Continue forced landing at an airport.

Instructor Notes

Engine failures can be simulated by reducing the throttle to idle. It is recommended to clear the engine every 1000 feet by increasing MP to 15 inches, then reducing it back to idle.

Do not reduce manifold pressure below 15 inches in a turbo aircraft above 18,000 feet MSL.

Engine failures are commonly practiced in the airport traffic pattern. While this is a good maneuver to develop a pilot's ability to complete a 180 degree gliding approach to a runway, emphasis on troubleshooting, positioning the aircraft for a stabilized approach, and landing accuracy is often overlooked. For the reasons stated above, it is important for pilots to practice power-off approaches to landings from altitudes above normal traffic pattern or from an en route altitude. Emphasis should be placed on proper troubleshooting as described in the AFM and CAPS procedures. Deploying CAPS should be considered as a possible strategy for dealing with any real life engine malfunctions.

Completion Standards

- Maintains aircraft control with airspeed +/-10 KIAS of V_G,
- Quickly steers the aircraft to suitable landing or CAPS deployment area,
- Positions the aircraft to a point where a stabilized approach to landing can be made,
- When workload permits, troubleshoots engine failure as described in the AFM,
- Secures engine if engine restart is not possible before landing,
- Simulates an emergency radio call and requests ATC assistance as necessary,
- Simulates a CAPS deployment at an appropriate altitude and airspeed, if necessary.

Common Errors

- Loses excessive altitude by not pitching to V_G soon after the engine failure,
- Fails to troubleshoot failed engine as described in the AFM,
- Does not quickly determine, and steer the aircraft towards a suitable landing or CAPS deployment area and/or decide to deploy CAPS, if warranted, with adequate altitude,
- Overshoots or undershoots intended touchdown point,
- Fails to manage glide angle with flaps and/or side slip as necessary,
- Fails to simulate declaring an emergency and getting priority handling and assistance from ATC,
- Fails to consider surface winds when selecting landing direction.

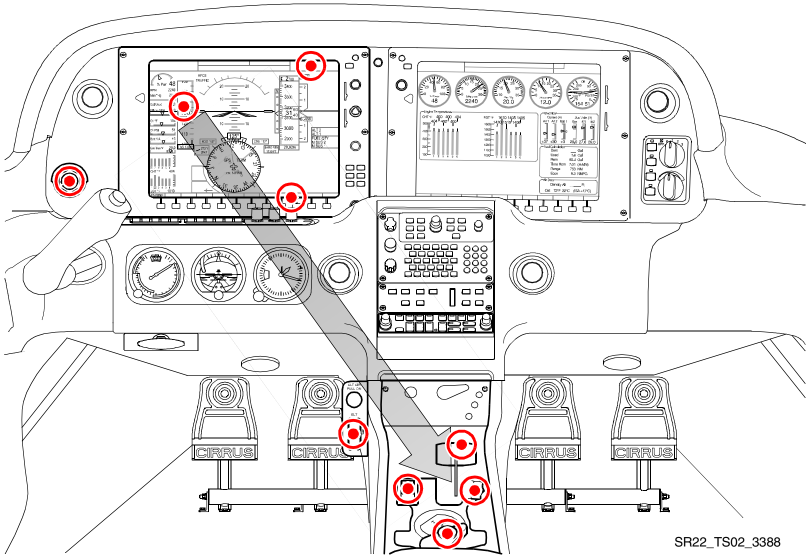
Emergency Landing Without Engine Power

The purposes of completing the Emergency Landing Without Engine Power checklist items are to secure the engine in an effort to reduce fire potential after touchdown and to alert ATC of the emergency situation through communication, transponder code, and ELT.

Turn the aircraft and glide towards an airport if available. Otherwise, glide the aircraft to the best location for CAPS deployment considering water, terrain, population density, etc. The flight path indicator on Perspective can be a useful tool to determine if the aircraft is capable of gliding to the intended airport. Monitor the flight path indicator when the aircraft is established and stabilized at best glide speed. If the flight path indicator points beyond the airport depicted on synthetic vision, a glide to the airport may be likely. Consider possible wind changes and the amount of maneuvering required to line up for a runway as the aircraft descends through altitude.

When reaching 2000 feet AGL, the pilot must make the decision whether to continue a gliding approach to landing or to activate CAPS. In many cases, CAPS will be the best option for survival, but it must be activated in time with sufficient altitude remaining. Do not continue an attempted landing unless landing is assured.

Maintain best glide speed with flaps at 0% until landing is assured. Use flaps to increase the descent angle when landing is assured. Eventually, flaps should be placed to 100% for touch-down. All power-off landings should be made with 100% flaps to reduce touchdown speed and potential impact forces.



Emergency Landing Without Engine Power

Procedure

1. Best Glide Speed .... ESTABLISH

   Pitch trim should be set approximately full aft for best glide airspeed. Pilots may consider using the IAS mode of the autopilot set to best glide to help with workload during the descent.

2. Radio .... Transmit (121.5 MHz) MAYDAY giving location and intentions

   Use the current frequency to transmit the mayday call if currently in communication with ATC. Otherwise, transmit on 121.5.

3. Transponder .... SQUAWK 7700
4. If off airport, ELT .... ACTIVATE
5. Power Lever .... IDLE
6. Mixture ....CUTOFF
7. Fuel Selector ....OFF
8. Ignition Switch..OFF
9. Fuel Pump ....OFF
10. Flaps (when landing is assured) 100%

11. Master Switches..OFF
12. Seat Belt(s) .... SECURED

Recovery (Training)

- Take aircraft control if the pilot simulates a CAPS deployment while the pilot conducts post deployment activities or,
- Initiate a go-around procedure at 500 feet AGL, or higher if required by regulation or safety, when a stabilized approach to landing at an airport cannot be conducted or,
- Continue forced landing at an airport.

Instructor Notes

The Emergency Landing Without Engine Power checklist is frequently overlooked by pilots conducting engine failure training. Instructors are encouraged to conduct engine failure training outside of the traffic pattern at altitudes that allow the pilot enough time to go through all checklist procedures. Doing so will also require pilots to determine if a gliding approach to landing or CAPS activation is best, given the unique circumstances.

Completion Standards

- Completes the Emergency Landing Without Engine Power checklist when workload permits,
- Makes a good decision whether to continue to a landing or to activate CAPS,
- Maintains best glide speed +/-10KTS.

Common Errors

- Fails to activate CAPS at a sufficient altitude,
- Hesitates to determine, and steer the aircraft towards, an airport within glide range,
- Descends at an airspeed much higher than best glide, reducing glide range,
- Fails to set 100% flaps for landing or extends flaps prematurely.

Unexplained Loss of Manifold Pressure

If SR22T or SR22TN aircraft experience an unexpected loss of normal manifold pressure, the engine will typically revert to operation similar to a normally aspirated aircraft at approximately the same altitude. However, continued flight should only be conducted to the nearest suitable landing place in order to investigate the cause of the unexpected loss of normal manifold pressure.

The four most probable causes are:

1. A leak or rupture at an induction system coupling or a loose or failed induction coupling hose clamp.
    a. This condition does not usually present a significant hazard, other than power loss equivalent to a normally-aspirated engine.
    b. While this condition is the most probable, the following three conditions may present an immediate hazard to continued safe flight. Because it is difficult for the pilot to distinguish between a simple induction system leak and any of the more hazardous causes, all unexpected losses of manifold pressure should be assumed hazardous.
2. A significant leak in the exhaust system.
    a. An exhaust leak may present a possible fire hazard. Reducing power and adjusting the mixture as described reduces the possibility of an engine compartment fire.
3. A loss of oil pressure to the wastegate actuator due to a general loss of engine oil pressure.
    a. Potentially caused by a failed oil line, oil line fitting, or oil pump
    b. Failure to maintain normal full manifold pressure at altitude may be an early indication of an oil leak and impending loss of oil pressure.
    c. Monitor for reduction in oil pressure; if observed continue to diversion airfield, but prepare for forced landing.
4. A failure of an internal component in the turbocharger.
    a. If the pilot experiences a sudden loss of manifold pressure and later observes declining oil pressure, it may be due to a failure of an internal turbocharger component. If there is a loss of oil pressure due to a failure of the turbocharger, engine oil may be vented through the tail pipe overboard.

b. Monitor for reduction in oil pressure; if observed continue to diversion airfield, but prepare for forced landing.

Training Limitations

- Limit failure to VMC,
- Maintain at least 15” of manifold pressure above FL180.

Procedure - Instructor

1. Reduce the throttle and announce the loss of manifold pressure,
2. Clear the engine every 1000 feet.

Procedure

1. Power .... ADJUST to minimum required for sustained flight
2. Mixture .... ADJUST for EGTs between 1300 to 1400 degrees F

   The mixture will need to be enrichened as the aircraft descends through altitude to maintain a combustible fuel-air ratio.
3. Descend to MINIMUM SAFE ALTITUDE from which a landing may be safely accomplished.

   Descent at best glide speed to extend glide range if necessary.
4. Divert to nearest suitable airfield.

   Consider CAPS if a landing at a suitable airfield is not available.
5. Radio.. Advise ATC landing is urgent or Transmit (121.5 MHz) MAYDAY giving location and intentions when workload permits.
6. Oil Pressure .... MONITOR

   A loss of engine oil pressure may cause the loss of manifold pressure. Plan for a forced landing or CAPS activation if oil pressure is steadily decreasing or low.
7. Land as soon as possible.

   Continuously monitor for signs of fire. Shut the engine OFF immediately at the first indications of a fire and initiate an emergency descent to a landing or CAPS activation.

Recovery

- Continue approach to landing at a suitable airfield, or
- Simulate an engine fire and continue scenario.

Instructor Notes

Simulate this failure by closing the throttle to the desired manifold pressure and announcing the loss of manifold pressure. For full effect of the scenario, it is recommended to conduct this failure at altitudes above 10,000 feet MSL.

It is recommended to conduct this failure below FL180 while VFR. Do not reduce power below 15” of manifold pressure above FL180. While a rupture in the upper deck in the most likely cause of the failure, there is a potential fire hazard due to a turbo failure.

Ensure pilots are aware of the fire hazard and include the fire potential in their subsequent decisions. Carefully investigate oil pressure, EGTs, and TITs looking for indications of a failed or blocked turbo. An indication of a blocked turbo may be if EGTs on the same side of the engine (i.e. 1, 3, 5) are all equally higher or lower than the opposite side (i.e. 2, 4, 6).

Completion Standards

- Recognizes the failure and promptly completes the emergency checklist items,
- Selects a suitable diversion airport and completes necessary arrival tasks,
- Maintains aircraft control, using available power to minimize descent rate,
- Monitors engine indications and describes possible indications of turbo or wastegate failures,
- Continuously monitors for signs of fire.

Common Errors

- Fails to describe the potential causes of the failure,
- Does not treat the failure as a potential emergency,
- Fails to land at the nearest suitable airport,
- Fails to maintain aircraft control due to the increased workload.

Engine Roughness or Partial Power Loss

If a partial engine failure permits level flight, land at a suitable airfield as soon as conditions permit. If conditions do not permit safe level flight, use partial power as necessary to set up a forced landing pattern over a suitable landing field. Always be prepared for a complete engine failure and consider CAPS deployment if a suitable landing site is not available. Refer to the AFM Section 10, Safety Information, for CAPS deployment scenarios and landing considerations.

Procedure - Instructor

1. Engine roughness - verbally announce engine roughness, surging, miss-firing, etc,
2. Partial power loss - reduce throttle and announce power loss.

Procedure

1. Air Conditioner (if installed) .... OFF
2. Fuel Pump .... BOOST

   Selecting BOOST on may clear the problem if vapor in the injection lines is the problem or if the engine-driven fuel pump has partially failed. The electric fuel pump will not provide sufficient fuel pressure to supply the engine if the engine-driven fuel pump completely fails.
3. Fuel Selector .... SWITCH TANKS

   Selecting the opposite fuel tank may resolve the problem if fuel starvation or contamination in one tank was the problem.
4. Mixture .... CHECK appropriate for flight conditions
5. Power Lever .... SWEEP

   Sweep the Power Lever through range as required to obtain smooth operation and required power.
6. Alternate Induction Air (SR20 or SR22) .... ON

   A gradual loss of manifold pressure and eventual engine roughness may result from the formation of intake ice. Opening the alternate engine air will provide air for engine operation if the normal source is blocked or the air filter is iced over.
7. Ignition Switch .... BOTH, L, then R

Cycling the ignition switch momentarily from BOTH to L and then to R may help identify the problem. An obvious power loss in single ignition operation indicates magneto or spark plug trouble. Lean the mixture to the recommended cruise setting. If engine does not smooth out in several minutes, try a richer mixture setting. Return ignition switch to the BOTH position unless extreme roughness dictates the use of a single magneto.

8. Land as soon as practical.

   Consider the use of CAPS if a safe landing at a suitable airport can not be guarantied.

Recovery (Training)

- Take aircraft control if the pilot decides to simulate a CAPS deployment while the pilot conducts post deployment tasks, or
- Verbally announce that roughness or power loss was alleviated and restore power to normal, or
- Initiate a go-around procedure at 500 feet AGL, or higher if required by regulation or safety, when a stabilized approach to landing at an airport cannot be conducted, or
- Continue landing.

Instructor Notes

Simulating engine roughness or a partial power loss can be a good method to prompt pilots to consider means of troubleshooting a failing engine.

Initiate this failure shortly after a pilot makes an adjustment to an engine control, such as turning off a boost pump, leaning the mixture, or making a power reduction. It can also be a good way to get pilots to realize the implications of not properly controlling fuel to air ratios during climbs or descents.

Simulating engine roughness and announcing erratic fuel flow indications is a good scenario to present to pilots flying turbo aircraft. These scenarios allow the instructor to assess a pilot's knowledge of engines, engine controls, and ADM skills.

Completion Standards

- Troubleshoots the engine roughness or partial power loss considering engine indications, environmental conditions, and engine control positions,

- Steers the aircraft towards a suitable landing airport,
- Maintains safe altitude until a glide to landing can be made,
- Continuously plans for an engine failure,
- Simulates declaring an emergency and receives priority handling and assistance from ATC if simulated conditions warrant.

Common Errors

- Prematurely starts a descent with a partial power loss or rough engine before aircraft is within a position to glide to the airport,
- Fails to properly troubleshoot and recognize the reason for engine roughness or power loss,
- Fails to maintain aircraft control while troubleshooting engine roughness or power loss,
- Fails to contact ATC declaring an emergency and requesting priority handling, if necessary,
- Fails to determine an appropriate landing spot or to initiate a CAPS deployment.

Loss of Oil Pressure

A loss of oil pressure is an emergency situation that typically results in a catastrophic engine failure. Immediate action by the pilot is required to steer the aircraft towards a suitable landing or CAPS deployment area. Reduce power to minimum for sustained level flight to extend engine life but preserve altitude as long as possible in preparation for an engine failure.

A rise in oil temperature due to the loss of oil pressure may or may not be seen. Do not immediately overlook a low oil pressure situation as an indication problem if oil temperature does not rise. Indication problems generally are identified by erratic and quick changes in pressure. A true loss of oil pressure is typically identified by a gradual and consistent decrease in pressure. Pilots are encouraged to monitor oil pressure during routine scanning to identify oil pressure issues early.

Procedure - Instructor

- Verbally announce the OIL PRESS message is present,
- After the pilot investigates oil temperature and pressure, announce that oil pressure is less than 10 PSI,
- Simulate engine seizure within 3-5 minutes of announcing failure by closing the throttle to idle,
- Clear engine every 1000 feet after simulated engine failure.

Procedure

1. Oil Pressure Gauge .... CHECK

   High oil temperature may or may not accompany low oil pressure.

   If pressure low:

   a. Power .... REDUCE to minimum for sustained flight
   b. Land as soon as possible.
   c. Prepare for potential engine failure.
      (1) Continually select suitable forced landing fields.
      (2) Prepare for CAPS activation if necessary.

Recovery (Training)

- Take aircraft control if the pilot simulates a CAPS deployment while the pilot conducts post deployment activities, or

- Initiate a go-around procedure at 500 feet AGL or higher if required by regulation or safety, when a stabilized approach to landing at an airport cannot be conducted, or
- Continue landing.

Instructor Notes

A loss of oil pressure scenario can be a good lead-in to an engine failure simulation or possible CAPS deployment simulation. Initiate this scenario during cruise in an area that is within 15 NM from a non-towered and low-traffic airport if the desired outcome is to conduct a glide approach to a landing.

Completion Standards

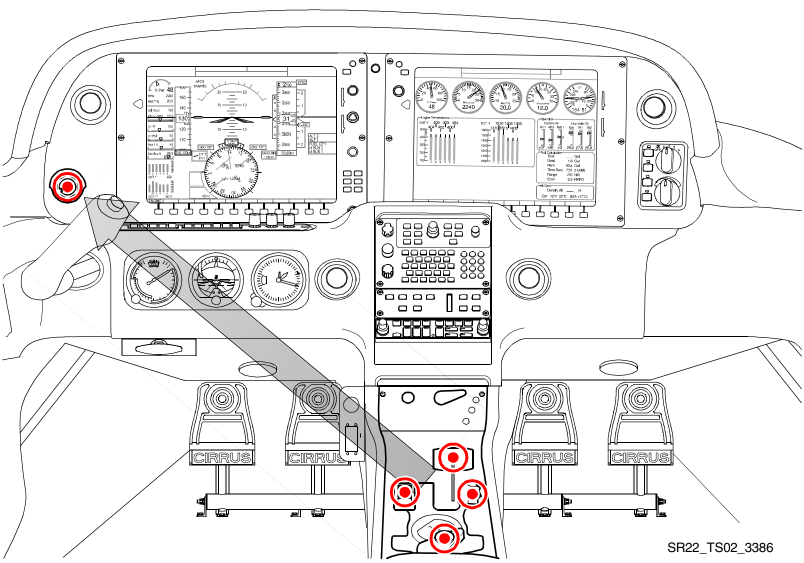
- Promptly investigates and determines the reason for the OIL PRESS message,
- Maintains altitude until aircraft is in a position to perform a power-off approach to landing,
- Completes the emergency checklist procedure as described in the AFM and reduces power to the minimum required for level flight,
- Adheres to applicable performance expectations for the Engine Failure in Flight Procedure if applicable.

Common Errors

- Fails to recognize the cause of the OIL PRESS message,
- Fails to reduce power to minimum for sustained flight for a low oil pressure situation,
- Fails to recognize the severity of a low oil pressure warning,
- Fails to divert to nearest suitable airport,
- Starts descent prematurely, before the aircraft is within glide range of a suitable runway,
- Fails to consider CAPS as an off-airport landing alternative.

Engine Fire In Flight

An engine fire in flight typically results from leaking fuel or oil in the engine compartment that comes in contact with the exhaust manifold. The engine must be shut down to remove the fuel source of the fire in effort to extinguish the fire. An emergency descent should be initiated promptly to help extinguish the fire and to accelerate altitude loss in preparation for an emergency landing or CAPS deployment. If CAPS is determined to be the best option, continue the descent until the aircraft is 2000 feet AGL, slow the aircraft within the deployment envelope, and activate CAPS. At this point, any fire should have been extinguished if the fuel was shutoff as per the emergency checklist and if the emergency descent was completed properly. But, be mindful of fire during the final descent and prepare to exit the aircraft quickly upon touchdown.



Engine Fire In Flight

Procedure - Instructor

1. Verbally announce fire or smoke from the cowling,
2. Pilot should simulate setting mixture to idle cutoff and fuel selector to the off position,

• Note •

Prevent the pilot from setting mixture to idle cutoff and fuel selector to the off position.

3. Reduce throttle to idle to simulate engine shutdown,
4. Initiate emergency descent,
5. Clear engine every 1000 feet of altitude loss,

• Note •

Limit power additions to 15” of MP to less than 3 seconds to prevent an increase of airspeed and possible overspeed situation.

Procedure

1. Mixture .... CUTOFF

   Placing the mixture to idle cutoff stops fuel flow at the mixture control valve located in the engine-driven fuel pump. This is the closest fuel cutoff point to the engine.

2. Fuel Pump..OFF

   Turning the auxiliary fuel pump off reduces remaining fuel pressure in the fuel system.

3. Fuel Selector..OFF

   Selecting the OFF position cuts off the fuel flow behind the engine firewall.

4. Airflow Selector ....OFF

   Select OFF the reduce the chance of contaminated air from entering the cabin.

5. Power Lever ....IDLE

   Reduce the power lever to IDLE to further reduce the chance of fire and to use remaining oil pressure to increase propeller pitch.

6. Ignition Switch...OFF

Turning the ignition switch to OFF further reduces the likelihood of combustion in the cylinders.

7. Cabin Doors .... PARTIALLY OPEN

   Partially open the cabin doors to remove smoke and fumes from the cabin. Be mindful of door position when activating CAPS.

8. Land as soon as possible.

   A high probability exists that an off-airport landing will be required. Use CAPS when a safe landing is in doubt, preferably above 2000 feet AGL.

Recovery (Training)

- Simulate a CAPS deployment. See Simulated CAPS Deployments section, or
- Continue emergency descent to a landing, or
- Complete a go-around at or above 500 feet AGL.

Instructor Notes

An engine fire scenario can be a good lead-in to a forced landing scenario, emergency descent, and/or a simulated CAPS deployment. It is recommended to initiate the failure during cruise flight, at least 3000 feet AGL, by verbally announcing smoke from the cowling. See the Emergency Descent or Simulated CAPS deployment sections as necessary. Engine restarts should not be attempted.

Ensure that the pilot reduces speed and follows the proper CAPS deployment procedure including choosing a safe deployment altitude.

When conducting an emergency descent over an airport, continue the descent to landing if a stabilized approach can be maintained through touchdown. Or, initiate a go-around by 500 feet AGL or higher if safety or regulations dictate. Pilots attempting a landing from an emergency descent often have trouble slowing the aircraft from V_{NE} to best glide and landing speeds. Repetition is usually required to master this maneuver.

Completion Standards

- Completes the Engine Fire checklist items from memory in a timely manner,
- Establishes an emergency descent smoothly and promptly and maintains V_{NO} +0/-5 KIAS,

- Determines best course of action to recover the aircraft, considering CAPS, off-airport landing, or airport landing,
- Completes the Emergency Landing Without Engine Power checklist memory items,
- Properly executes a go-around when conditions warrant.

Common Errors

- Fails to complete Engine Fire checklist memory items,
- Does not initiate emergency descent correctly and promptly if conditions warrant,
- Fails to correctly determine whether to land at an airport, land off-airport, or deploy CAPS.

Electrical Malfunctions Overview

Cirrus aircraft are equipped with a robust, fault tolerant electrical system with redundant sources of power and protective devices. It is important for pilots to be knowledgeable of the aircraft's power generation, power distribution, indicating systems, and caution and warning systems because the aircraft's primary flight instruments rely on electrical power for operation. During flight training, multiple electrical failures will be simulated to develop and assess the pilot's knowledge of the electrical system, troubleshooting techniques, and decision making. Use the guidance in this section, coupled with the procedures detailed in the Pilot's Operating Handbook, when handling training of electrical malfunctions.

Instructor Notes

A good method to evaluate a pilot's knowledge of the electrical system and aeronautical decision making skills is to introduce electrical malfunction scenarios during training. Ensure pilots are able to describe the aircraft's power generation, basic power distribution, and troubleshooting methods before presenting electrical malfunctions in flight.

CATS II for Avidyne, and CATS III for Perspective are great resources for learning and teaching the aircraft's electrical system. Reference the POH, Section 7 for additional information.

Conducting electrical malfunction scenarios under VFR and simulated IFR flight creates more training flexibility and allows pilots to carry out decisions made in flight.

External factors greatly affect how pilots should troubleshoot electrical malfunctions. Ensure pilots consider the following factors when briefing and conducting electrical system malfunctions:

- Day versus night,
- VFR versus IFR,
- Operations in class B or C airspace,
- Various IFR situations including the ability to exit IMC, or operations in icing conditions.

Training Limitations

- Electrical malfunctions are not permitted in IMC or when VMC can not be maintained,

- Limit operations to 10 minutes with alternators turned off,
- Do not turn both batteries off in flight if ATC or intercom communication is necessary. Energize batteries before turning alternators back on,
- Do not turn ALT 1, ALT 2, and BATT 1 off if intercom communication is needed or if external communication is required by the instructor.
- Electrical fire should only be simulated in class E or G airspace under VFR or simulated IFR by verbally announcing the fire.

Alternator 1 and 2 Failures

An alternator failure is recognized through the Crew Alerting System (CAS) on the Primary Flight Display. Pilots are encouraged to call up the Engine page on the Multi Function Display to verify what has failed. Then, reference the appropriate checklist for troubleshooting.

In most cases, an alternator 1 failure is recognized by the following:

- ALT 1 caution,
- Main Bus 1 voltage at approximately 24 volts and Low M Bus caution message,
- Battery 1 discharging and associated caution message.

An alternator 2 failure is recognized by and ALT 2 caution message. No other cautions or warnings are present because alternator 1 is capable of powering the remaining electrical equipment.

A single alternator failure is typically an abnormal condition, not an emergency procedure. Pilots are encouraged to follow checklist guidance when troubleshooting alternator issues. Reference the CAS checklist group for alternator troubleshooting guidance. The autopilot should be engaged to decrease pilot workload during troubleshooting efforts.

Distance remaining to destination, weather, and availability of maintenance are factors that pilots should consider when determining the best course of action with a failed alternator. The Kinds of Operation Equipment list found in section 2 of the Pilot's Operating Handbook allows flight to depart VFR day and night with a failed alternator 2. Alternator 1 is required for all flight dispatches. It is recommended to land at an airport with maintenance capabilities in the event of an alternator 1 failure to reduce aircraft down-time.

Procedure - Instructor

1. Pull the ALT 1 or ALT 2 circuit breaker and wait for annunciator, or
2. Turn off the ALT 1 or ALT 2 switch,
3. Allow pilot to identify and respond to the alternator failure,
4. Pull the alternator circuit breaker once pilot restores breaker during troubleshooting to simulate a second 'pop',
5. Allow pilot to determine the best course of action,
6. Restore the failed alternator within 10 minutes.

Procedure

1. ALT 1 or 2 Circuit Breaker .... CHECK & SET
2. ALT 1 or 2 Master Switch .... CYCLE

   Do not attempt multiple restarts if the failed alternator does not start on the initial cycle. If alternator does not reset (low A1 Current and M1 voltage):

3. ALT 1 or 2 Master Switch .... OFF

For Alternator 1 Failures:

1. Non-Essential Bus Loads .... REDUCE
   a. If flight conditions permit, consider shedding the following to preserve Battery 1:
      (1) Air conditioning,
      (2) Cabin fan,
      (3) Landing light,
      (4) Yaw servo,
      (5) Convenience power (aux items plugged into armrest jack)
2. Continue flight, avoiding IMC or night flight as able (reduced power redundancy).

Recovery (Training)

- Restore circuit breaker position after pilot decides the appropriate action, within 10 minutes of pulling,
- Allow pilot to carry out decisions made if possible.

Instructor Notes

During training, simulate alternator failures to test a pilot's systems knowledge and decision-making ability, and to also to create meaningful distractions during flight. Ensure the pilot maintains aircraft control, troubleshoots the failed alternator, uses the autopilot to manage workload while troubleshooting, and considers external factors when assessing the impact to flight and subsequent decisions. It is beneficial to discuss and carry out alternator failures with different external factors. After conducting a simulated alternator failure in VFR conditions, conduct a mental exercise of how the situation would have been different in IMC. Or, discuss how night conditions might affect both pilot workload and decisions to continue to the destination or divert.

The most realistic method of simulating an alternator failure in flight is to pull the ALT 1 or ALT 2 circuit breaker. A diagram of the circuit breaker panel is useful when finding the desired breaker, especially when pulling from the right seat. It is recommended to practice pulling the breaker on the ground, without the pilot in the left seat, before attempting in flight. Note that the MCU logic module delays the ALT annunciator for approximately three to five seconds. Reference the Guidance on Pulling Circuit Breakers section for more information about pulling circuit breakers.

An alternative method to fail an alternator is to reach across and turn off the alternator switch. This can usually be accomplished without the pilot noticing if he or she is pre-occupied with other realistic distractions.

As with any abnormal situation, ensure the pilot references the appropriate checklist to aid in troubleshooting the problem. Restore alternator power within 10 minutes of failing the alternator.

Completion Standards

- Promptly recognizes and identifies the failure,
- Uses the autopilot to reduce workload,
- Calls up the appropriate checklist and follows checklist procedure as a do-list,
- Makes appropriate decisions considering external factors such as weather conditions, airspace ahead, nature of the failure, ETE to destination, etc.

Common Errors

- Completes checklist items without reference to the checklist,
- Incorrectly identifies the cause of the failure,
- Attempts multiple circuit breaker resets,
- Fails to correctly load-shed.

Electrical Fire (Cabin Fire In Flight)

An electrical fire or cabin fire in flight is an emergency situation requiring immediate pilot action. The pilot must turn off power sources and electrical equipment to eliminate an electrical fire. In VFR conditions, it is recommended to turn off both batteries and alternators. Reference the magnetic compass, backup airspeed indicator, backup altimeter, and outside visual reference for aircraft control.

In IMC conditions, or conditions that require flight by reference to instruments, turn off all switches except BATT 2 to preserve power to the primary flight display and backup attitude indicator. There is a high probability that the source of fire will be eliminated. Turn off BATT 2 if the fire continues to burn. Activate CAPS if controlled flight can not be maintained.

Procedure - Instructor

1. While in VMC or simulated IFR, announce the electrical fire,

Procedure

1. <u>Oxygen System (if applicable)</u> .... <u>OFF</u>

   Turn off the oxygen system, if applicable, to reduce the chance of a severe fire in the cabin.

2. <u>Bat-Alt Master Switches</u> .... <u>OFF, AS REQ'D</u>

   In VFR, turn off all battery and alternator switches. When flight by reference to instruments is required, leave BATT 2 ON.

3. <u>Fire Extinguisher</u> .... <u>ACTIVATE</u>

• Note •

If airflow is not sufficient to clear smoke or fumes from cabin:

4. <u>Cabin Doors</u> .... <u>PARTIALLY OPEN</u>
5. Avionics Power Switch .... OFF
6. All other switches .... OFF
7. Land as soon as possible.

   It is not possible to maintain aircraft control in IMC without electrical power to the PFD and/or backup attitude indicator. Activate CAPS if aircraft control can not be maintained.

8. Air Conditioner (if installed) .... OFF

9. Airflow Selector ....OFF
10. Bat-Alt Master Switches ....ON
11. Avionics Power Switch ....ON
12. Required Systems ....ACTIVATE one at a time
13. Temperature Selector.. COLD
14. Vent Selector......................... FEET/PANEL/DEFROST POSITION
15. Airflow Selector ....SET AIRFLOW TO MAXIMUM
16. Panel Eyeball Outlets...OPEN
17. Land as soon as possible.

Recovery (Training)

- Restore electrical power at scenario completion.

Instructor Notes

An electrical fire is an emergency situation. It is recommended to practice this failure in a simulator or flight training device if possible. A simulated electrical fire while in simulated IMC can be a good setup for a simulated CAPS deployment.

Following the Cabin Fire checklist procedures for VFR and/or IMC will eliminate the intercom feature and will prevent the instructor from communicating with ATC. This procedure may be safely simulated in the aircraft if the following guidance is followed.

- Adhere to all electrical malfunction limitations at all times,
- Conduct the scenario when ATC communication or communication with other aircraft is not necessary for safe flight,
- Discontinue the scenario and restore all power when intercom or external communication is necessary for safe flight.

Completion Standards

- Recognizes the severity of the electrical fire and responds by completing the Cabin Fire in Flight checklist procedures,
- Takes appropriate action to eliminate cabin smoke and fumes,
- Diverts to nearest suitable airport for approach and landing, or
- Simulates CAPS deployment if aircraft control cannot be maintained,
- Makes appropriate decisions considering all external factors.

Common Errors

- Fails to complete Cabin Fire in Flight checklist memory items in a timely fashion,
- Fails to consider VMC or IMC when turning off switches to attempt to eliminate the fire,
- Fails to land the aircraft as soon as possible,
- Fails to recognize if/when aircraft attitude cannot be maintained in IMC,
- Fails to maintain positive aircraft control due to high workloads and increased stress.

Wing Fire In Flight

Procedure

- Verbally announce the wing fire,

Recovery (Training)

- Verbally announce the wing fire is extinguished,
- Turn pitot heat, strobe lights, navigation lights, and landing lights switches back on as required,
- Carry out scenario to landing if prudent and safe.

Instructor Notes

A simulated wing fire in flight can be a good lead-in to a diversion to an alternate airport. Pilots often fail to land as soon as possible, as recommended by the POH, even after the fire is extinguished. This scenario can also be a good lead-in to an emergency descent procedure.

The Wing Fire In Flight checklist procedure requires pitot heat, navigation lights, strobe lights, and landing/recognition lights to be turned off. Simulate this failure in an area with low congestion. Restore the lights as required after the pilot turns the lights off.

Completion Standards

- Completes Wing Fire In Flight checklist procedures,
- Slips the wing tip that is on fire away from the wind and cabin or initiates an emergency descent to extinguish the fire,
- Lands the aircraft as soon as possible.

Common Errors

- Fails to complete the Wing Fire In Flight checklist procedure,
- Fails to slip or enter an emergency descent to extinguish the fire,
- Neglects to land as soon as possible.

Integrated Avionics Malfunctions Overview

Cirrus Perspective avionics are robust, fault tolerant, and redundant. Although a component failure is highly unlikely, it is important to train pilots how to handle various avionics-related failures. Focus ground and flight training on the following objectives:

- Ability to maintain aircraft control,
- Proper identification of the failed component,
- Knowledge of other avionics equipment affected by the failed equipment, primarily the autopilot,
- Knowledge of information, features, or functions that are rendered inoperative by the failed equipment,
- Proper use of backup instrumentation,
- Knowledge and use of ATC services available to reduce workload.

The following table is a useful tool that describes how autopilot modes are affected by various Perspective component failures. An ‘X’ in the

Failure	ROL	HDG	NAV	APR	LVL	PIT	IAS VS ALT	GS GP	VNAV
PFD Screen	x	x	x	x	x	x	x	x	x
PFD Power[a]	x	x	x	x	x	x	x	x	x
ADC[b]	x	x[c]	x	x	x[d]	x			
Single AHRS	x	x	x	x	x	x	x	x	x
Dual AHRS									
GIA 1[e]	x	x	x	x	x	x	x	x	x
GIA 2	x	x	x	x	x	x	x	x	x

a. The autopilot will revert to ROL mode when the PFD power is failed. All lateral modes may be reselected and used.
b. Assumes system with 1 ADC or 2 failed ADCs. All modes of the AP will be available with a single ADC failure in a dual ADC configuration.
c.Turns to heading or to intercept a course will be made at half standard rate.
d. Only the wings level mode will be available with a ADC failure. Use PIT mode or hand fly for vertical control.
e. The autopilot will revert to ROL and PIT mode upon failure. All other modes may be reselected

box means the autopilot mode will be available during the respective equipment failure.

Training Limitations

- Limit avionics malfunctions to VMC and when the flight can continue in VMC to landing,

• Note •

It is permissible to fly in IMC while in reversionary mode as long as both the PFD and MFD screens are visible and charts and checklists are available through other sources.

- Restore power to failed equipment before entering IMC,
- Ensure ATC communication is maintained as required during failures,
- Do not power down the Air Data Computer when the altitude reporting (Mode C) capability of the transponder is required by regulations or necessary for safe flight,
- Limit failures to areas of low traffic congestion and instructor workload.

Instructor Notes

Pulling circuit breakers may be required to realistically conduct simulated avionics failures in the aircraft. The following components may be restored in flight by resetting the respective circuit breaker.

- AHRS 1 and AHRS 2,

• Note •

Maintain straight and level flight during the AHRS alignment process.

- ADC 1 and ADC 2 if applicable,
- PFD,
- MFD,
- GIA 1 and GIA 2,
- Autopilot.

Cirrus recommends conducting these failures in a simulator or flight training device that is capable of accurately representing failure modes when possible.

PFD Display Failure and Reversionary Mode

It is possible to enter and exit reversionary mode in flight by pressing the reversionary mode button.

Although all autopilot modes and all flight and navigation instruments are available in reversionary mode, pilots must be aware that certain MFD information, features, and functions are not available in reversionary mode.

The following information and resources will not be available while in reversionary mode:

- Approach charts,
- Checklists,
- Detailed airport and frequency information,
- Most satellite weather products
- Lean assist feature,
- TKS tank selection control,

The following information and resources will not be available with a PFD power loss:

- Baro setting unchangeable with PFD power loss; use backup altimeter,
- Com volume and squelch adjustment,
- Loss of Com 1 and Nav 1 control; Com 1 defaults to 121.5,

• Note •

The autopilot will revert to roll mode when the PFD is powered down. It is possible to re-engage any mode of the autopilot.

Procedure - Instructor

- Dim the PFD screen brightness to 0% or,
- Pull both PFD circuit breakers.

Procedure

1. Display Backup .... ACTIVATE

   Press the red button between the MFD and PFD to activate the display backup if the primary instruments are not displayed on the MFD. Use backup charts, checklists, and airport information as required.

2. Land as soon as practical.

Recovery (Training)

Upon landing or scenario conclusion,

- Restore PFD screen brightness to AUTO or,
- Restore PFD circuit breakers.

Instructor Notes

A PFD display failure or power loss can be simulated by the following methods. Either dim the PFD brightness to 0% or pull both PFD circuit breakers. Pulling the circuit breakers will force the Perspective avionics into reversionary mode. Dimming the screen will require the pilot to force the avionics into reversionary mode.

VFR and IFR pilots must be comfortable and prepared to operate in reversionary mode. Presenting this scenario in cruise flight with approximately 10 minutes before the top of descent is effective. Be sure to provide ample time for the pilot to become comfortable flying in reversionary mode before entering high-workload phases of flight.

Vertical descent planning, typically accomplished on the Flight Plan page, will only be available through the options on the Direct-To window.

Completion Standards

- Recognizes PFD failure and selects reversionary mode,
- Uses the correct modes of the autopilot and/or hand-flies to maintain aircraft control within applicable private or instrument practical test standards,
- Determines the best course of action considering external factors, such as weather, ATC services available, airport services, level of workload, and pilot proficiency,
- Utilizes backup charts and checklists,

Common Errors

- Fails to carry backup charting or checklist resources,
- Fails to recognize the autopilot change to roll mode,
- Inability to control the aircraft while scanning primary instruments on the MFD,
- Fails to recognize and account for the loss of Com 1.

Air Data Computer Failure

An air data failure could be caused by faulty input information. Look for faulty indications on the standby airspeed and altimeter to verify. Troubleshoot an ADC failure by resetting the ADC circuit breaker(s), switching to the alternate static source, and turning pitot heat on. Adjust the instrument scan to include the backup airspeed and altimeter.

The following information will not be available during an air data failure with a single ADC:

- PFD airspeed,
- PFD altitude,
- PFD vertical speed,
- Percent power, except SR22Ts,
- OAT,
- Wind information,
- TAS,
- Transponder Mode C (single ADC).

Pitch control is not available when the LVL autopilot mode is selected. The lateral ROL mode, or wing leveler, is available. Pilots may hand-fly or use PIT mode of the autopilot to maintain vertical control.

Procedure - Instructor

1. Pull the ADC 1 circuit breaker,
2. If dual ADCs are installed, reselect ADC 1 from the PFD sensor menu.

Procedure

1. <u>ADC Circuit Breaker .... SET</u>

   If open, reset (close) circuit breaker.

2. <u>Revert to Standby Instruments (Altitude, Airspeed).</u>

   Verify the standby instruments are working properly by maneuvering the aircraft slightly and looking for the expected change. i.e. enter a slight climb and verify that airspeed decreases and altitude increases. Select the alternate static source and verify pitot heat is on.

3. Land as soon as practical.

Recovery (Training)

- Reset the ADC 1 circuit breaker.

Instructor Notes

Simulating an air data failure is a good way to create a partial panel situation during training for an instrument rating. Failing the air data computer will force the pilot to scan and interpret the standby airspeed and altimeter. The failure also limits various modes of the autopilot that rely on air data information for control. This forces the pilot to hand-fly or use an alternate means to control the aircraft. See the Autopilot Failure Modes table earlier in this section for more information.

During the simulated failure, it is possible to reset the ADC circuit breaker(s) and restore the ADC in flight.

Completion Standards

- Correctly identifies the ADC failure,
- Completes the Air Data Computer Failure checklist procedure,
- Checks standby airspeed and altimeter indications and selects alternate static source and pitot heat as necessary,
- Uses the correct modes of the autopilot or hand-flies to maintain aircraft control within applicable private or instrument practical test standards.

Common Errors

- Fails to recognize affected modes of the autopilot,
- Fails to control the aircraft airspeed and altitude within applicable standards,
- Fails to notify ATC and request assistance as necessary,
- Determines the best course of action considering external factors such as: weather, ATC services available, airport services, level of workload, and pilot proficiency.

AHRS Failure

In order to lose all AHRS information, aircraft equipped with dual attitude heading and reference systems would need to have a dual AHRS failure. Dual AHRS equipped aircraft will automatically switch from one AHRS unit to the other if performance degradation in one AHRS is recognized by the internal system monitoring. A dual AHRS failure, or single AHRS failure in aircraft equipped with one AHRS, can be recognized by the following indications:

- Loss of Synthetic Vision or horizon indications,
- Red “X” over the attitude indicator,
- “ATTITUDE FAIL” annunciator over the attitude indicator,
- Loss of heading information,
- Red “X” over the heading information,
- CDI will remain in the vertical position and provide left and right of course deviation indications.

It is important to note that the PFD CDI needle will be oriented straight up, and still display accurate course deviations for GPS and LOC courses. GS information will also be available while conducting ILS approaches. TRK and DTK can be displayed on the MFD user-defined data field for reference. Pitch and roll information is obtained through outside visual reference or the backup attitude indicator and heading information is obtained through the magnetic compass and/or ground track.

The GFC 700 autopilot will not be available during a dual AHRS failure. See the Autopilot Failure Modes table for more information.

Procedure - Instructor

1. Pull both AHRS 1 and 2 circuit breakers, or
2. Pull AHRS 1 circuit breaker. Use PFD softkeys to switch the sensor source back to AHRS 1.

Procedure

1. Verify Avionics System has switched to functioning AHRS

   If not, manually switch to functioning AHRS and attempt to bring failed AHRS back on-line:

2. Failed AHRS Circuit Breaker .... SET

If open, reset (close) circuit breaker. If circuit breaker opens again, do not reset.

3. Be prepared to revert to Standby Instruments (attitude / heading).

   Left and right course indications will be available on the HSI. Refer to the magnetic compass for heading information.

Recovery (Training)

- Reset both AHRS 1 and 2 circuit breakers and maintain straight and level flight through the alignment process.

Instructor Notes

Instrument applicants must demonstrate the ability to conduct a non precision approach without the use of primary flight instruments as per the Instrument Rating Practical Test Standards. Training pilots to handle a dual AHRS failure by pulling AHRS circuit breakers develops the skills necessary to pass the instrument rating practical test and will help prepare pilots for the unlikely event of a loss of AHRS information.

Pilots typically need ample time conducting BAIF with the AHRS failed before attempting more advanced maneuvers, such as non precision or precision approaches. Increase pilot workload by assigning various avionics tasks once basic proficiency is demonstrated during partial panel BAIF. Emphasize small corrections, proper trim, and known power settings while conducting partial panel BAIF.

It is possible to reset and re-align AHRS units in flight by resetting the circuit breaker(s) and maintaining level flight.

Completion Standards

- Recognizes the failed equipment, ensures that the system switches the sensor information to AHRS 2 if available,
- Informs the instructor or ATC of failure, assistance needed, and remaining navigation capabilities,
- Determines the best course of action considering external factors such as the weather, ATC services available, airport services, level of workload, and pilot proficiency,
- Maintains aircraft control at all times within applicable practical test standards for the procedure or phase of flight being performed.

Common Errors

- Fails to maintain aircraft control within applicable practical test standards,
- Fails to include backup attitude indicator in instrument scan,
- Fails to include TRK and/or compass heading in scan,
- Over-controls pitch and roll,
- Neglects to inform ATC or the instructor of the failure and requested assistance,
- Unable to adjust to a partial panel scan,
- Loses aircraft control, requiring instructor intervention, and fails to consider a CAPS deployment.

GIA Failure

The Garmin Integrated Avionics (GIA) 1 powers COM 1, NAV 1, and GPS 1. GIA 2 powers COM 2, NAV 2, and GPS 2. In the event of a failure, the respective COM and NAV will be replaced with a red ‘x’ while the COM frequency defaults to 121.5. Before simulating this failure by pulling the GIA 1 or 2 circuit breakers, note the frequency being used in the respective COM. It is very common for pilots to overlook the loss of COM or NAV and fail to re-tune the active frequency in COM 2. Be sure to highlight the change and reset the frequency as necessary for uninterrupted communication with ATC or other traffic.

Procedure - Instructor

1. Pull GIA 1 or 2 circuit breaker.

Procedure

1. Communication .... USE COM 1 or 2

   Use COM 1 if GIA 2 fails or use COM 2 if GIA 1 fails.
2. Navigation .... USE VLOC 2 if applicable
3. Land as soon as practical.

Recovery (Training)

- Reset GIA 1 or 2 circuit breaker.

Instructor Notes

Failing the GIA 1 or 2 can be a good scenario to test a pilot’s knowledge of the avionics components and integration.

Failing GIA 1 causes GPS 1 to power down. The system automatically switches to and uses GPS 2, but navigation is temporarily interrupted. The temporary loss of navigation causes the autopilot to switch from NAV mode to ROL mode. Pilots often fail to realize the change because there will be no sudden turns or changes to flight caused by the autopilot. Teach pilots to scan the autopilot annunciators frequently and especially during system failures. The autopilot is not interrupted when GIA 2 is powered down.

It is not recommended to pull GIA 1 and 2 circuit breakers simultaneously when ATC communication or any form of onboard navigation is necessary for safe flight.

Completion Standards

- Recognizes the failed equipment and resets communication frequencies as required,
- Re-engages the desired mode of the autopilot if necessary,
- Determines the best course of action considering external factors such as weather, ATC services available, airport services, level of workload, and pilot proficiency.

Common Errors

- Fails to recognize and change COM frequencies as required,
- Fails to recognize the autopilot mode switch from NAV to ROL.

Loss of GPS Integrity

A loss of GPS integrity is an abnormal situation that requires the pilot to reference alternative forms of navigation. Pilots flying IFR should notify ATC immediately of the reduced navigational capabilities. It may be possible for ATC to provide radar vectors but expect to join victor airways to the intended destination. Also, consider the type of approaches available at the destination airport. A GPS approach will not be possible with a loss of GPS integrity.

Losing GPS integrity may have more impact when flying VFR due to the lack of ATC services available compared to when flying on an IFR flight plan. The ‘dead reckoning’ mode of the GPS will be helpful for maintaining situational awareness but use this feature with caution. VFR pilots are encouraged to switch navigation sources to VOR and navigate on victor airways to the final destination.

Procedure

- Verbally announce the loss of integrity, or
- Cover the HSI, ensuring that heading information is available. Remove the cover once the pilot changes the navigation source from GPS to VOR.

Recovery (Training)

- Verbally announce scenario is over.

Instructor Notes

Pilots flying with advanced cockpits, such as Cirrus Perspective, use GPS for the majority of navigation. GPS is safe, reliable, accurate, and provides a magnitude of information beyond other navigation sources onboard the aircraft. However, it is possible to encounter situations that require VOR navigation, such as a loss of GPS integrity or performing a stand-alone VOR approach.

Simulating a GPS loss of integrity will force the pilot to inform ATC, (on IFR), modify the route of flight, tune VOR frequencies, and set the CDI course as desired. These fundamental skills often degrade with time and periodic practice is required.

Simulating a loss of GPS integrity is a good scenario to perform during advanced IFR training, an IPC, private pilot training, and instrument rating training.

Completion Standards

- Recognizes failure and selects an alternate form of navigation,
- Advises ATC and requests alternate routing if necessary,
- Determines the best course of action considering external factors such as weather, ATC services available, airport services, level of workload, and pilot proficiency.

Common Errors

- Neglects to notify ATC of failure and request assistance as necessary,
- Loses situational awareness.

Runaway Autopilot

Procedure

- Apply pressure to the side stick after the autopilot is engaged or mode is changed,
- Hold pressure until the autopilot is disabled or disengaged.

Recovery (Training)

- Discontinue pressure,
- Continue remainder of flight without the autopilot.

Instructor Notes

Simulating an autopilot runaway is helpful to determine if a pilot is actively monitoring flight status and will overpower and disengage the autopilot when necessary.

It is best to simulate this failure shortly after the pilot engages the autopilot or changes autopilot modes. Instructors can cleverly simulate the runaway by applying pressure to the side stick with their knee. Allow the pilot to overpower the inputs, but reapply pressure once the pilot relaxes control and fails to disconnect the autopilot.

This can be a quick and good scenario to perform when it is desired that the pilot hand fly for the remainder of the flight. Doing this at the beginning of a long IFR flight can be a good scenario to exercise the pilot's decision making. Or, simply do this at the top of descent to force the pilot to hand fly the descent and approach.

• Note •

Do not simulate this failure in flight situations that require precise heading or altitude control. Do not put the aircraft into an attitude with excessive pitch or roll with excessive descent rates.

Completion Standards

- Promptly recognizes failure and overpowers the autopilot to maintain aircraft control,
- Promptly disconnects or disables the autopilot,
- Determines the best course of action considering external factors such as weather, ATC services available, airport services, level of workload, and pilot proficiency.

Common Errors

- Fails to overpower the autopilot and maintain aircraft control,
- Fails to disengage or disable the autopilot,
- Fails to hand-fly within applicable practical test standards.

Other Emergency Procedures Overview

The emergency and abnormal procedures discussed in this section are normally the result of the pilot making poor decisions, inadequate planning, or the pilot lacking fundamental skills. These procedures are practiced during flight training with the objective of developing decision making skills to avoid these situations.

Instructor Notes

Providing these situations in a scenario format will help develop the pilot's decision making capabilities as well as his or her abilities to handle these situations.

The realism of the scenario directly affects the quality of the learning experience. The instructor must plan these scenarios thoughtfully and anticipate pilot reactions and decisions. Allowing pilots to carry out poor decisions, while keeping all safety margins intact, provides an excellent learning experience.

Performing these scenarios in a simulator or flight training device will help create realism and increase safety.

See individual procedures for specific limitations.

Unusual Attitudes

Unusual attitudes are most likely to be encountered by pilots who lack instrument skills, VFR pilots who inadvertently entered IMC, or pilots experiencing an abnormally high workload. Pilots who have entered an unusual attitude have temporarily lost aircraft control or failed to maintain aircraft control. At the moment of recognition, the pilot must make an immediate decision if the aircraft can be recovered using traditional recovery techniques such as: a manual recovery, engaging the autopilot (if within limitations), or activating CAPS. Immediate action by the pilot is required to recover the aircraft regardless of which recovery method is chosen.

It is important to note that pilots who have lost aircraft control may be disoriented beyond the point where traditional, hand flown recovery techniques are effective. CAPS activation may be the best recovery option available.

Preventing unusual attitudes is the best course of action. Pilots who maintain high levels of IFR proficiency and VFR pilots who remain clear of IMC conditions are less likely to enter an unusual attitude. Frequent recurrent training is helpful, but it is also helpful to frequently fly in IFR in order to maintain avionics programming proficiency and familiarity with IFR communications and procedures.

Pilots are encourage to use the autopilot during periods of high workload, but should not become overly-dependent on the autopilot for aircraft control.

Training Limitations

- Minimum recovery altitude is 1500 feet AGL,
- Do not exceed 60 degrees of bank or 30 degrees of pitch up or down,
- Initiate recovery before V_{NE} is exceeded,
- Conduct maneuver in VMC only,
- Conduct maneuver in class E or G airspace unless permission for abrupt maneuvering can be obtained.

Procedure

- Instruct the pilot to close eyes and put head down with view limiting device on,
- Take control and put aircraft into unusual attitude, or
- Instruct pilot to continue flying without reference to instruments until unusual attitude is entered,
- Instruct pilot to look up and take aircraft control,
- Guard flight controls and throttle for correct recovery sequence.

Recovery (Training)

- *Nose high:* add power while reducing pitch to maintain airspeed and level the wings,
- *Nose low:* reduce power while leveling the wings and increase pitch after wings are level to stop the descent.

Instructor Notes

Practice unusual attitudes while preparing a pilot for the private pilot and instrument rating practical tests, advanced instrument training, instrument proficiency checks, and normal or partial panel BAIF.

Aircraft equipped with the GFC 700 autopilot have a useful tool to help pilots regain their composure after recovering from an unusual attitude. It must be clear to pilots that the Level (LVL) button should not be used for upset recovery. Pilots should regain aircraft control manually, and are encouraged to engage the LVL mode shortly thereafter. Using the LVL mode for upset recovery may result in an excessive loss of altitude or recovery may not be possible due to low altitude, excessive loads, or if the aircraft's attitude exceeds that autopilot engagement limitations. Pilots should activate CAPS anytime aircraft control cannot be maintained.

Practice nose-high and nose-low unusual attitudes. With the pilot's head down and view-limiting device on, place the aircraft into an unusual attitude. Make small control inputs that keep roll rates below three degrees per second so the pilot is unable to kinesthetically sense what the aircraft is doing.

Watch for signs of motion sickness while conducting unusual attitudes. Discontinue the maneuver and remove the pilot's view limiting device to avoid discomfort.

It is also recommended to practice unusual attitude recoveries when practicing partial panel BAIF.

Closely guard the flight controls and throttle during recovery and take control if necessary to keep the aircraft within airspeed limitations.

Completion Standards

- Promptly recognizes the unusual attitude and applies corrective actions as described above and in the Instrument Flying Handbook,
- Engages autopilot once the aircraft is recovered,
- Returns the aircraft to the previously assigned heading or course, and/or altitude,
- Regains situational awareness.

Common Errors

- Fails to scan and interpret flight attitude quickly,
- Fails to add power from a nose low unusual attitude and loses significant airspeed and possibly aircraft control,
- Fails to return aircraft to previously assigned heading or course, and/or altitude,
- Fails to initiate recovery or recovers using wrong technique. For example, the pilot increases pitch before leveling the wings on a nose low recovery placing the aircraft in a steeper spiral.

TAWS Escape Maneuver

Training Limitations

- Abide by all legal altitude restrictions,
- Do not put the aircraft in a direct and immediate collision course with obstacles or terrain other than for normal descent to landing.

Procedure

- While the pilot is flying, verbally announce TAWS warning.

Recovery (Training)

- Increase pitch and power to avoid a collision with the obstacle or terrain.

Instructor Notes

Creating a safe scenario that leads to a TAWS warning and subsequent escape maneuver is very difficult and often impossible without a simulator or flight training device. Flying close enough to the ground or obstacles to trigger a TAWS warning usually leaves inadequate safety margins and should be approached cautiously while considering all legal altitude requirements.

Consider the following technique when training pilots to respond to a TAWS warning. Adjust the barometric pressure so the depicted altitude is well below the actual altitude while practicing unusual attitudes. Shortly after the unusual attitude recovery, verbally announce ‘TERRAIN AHEAD, PULL UP, PULL UP’ to prompt the pilot into the TAWS escape maneuver.

CFIT accidents can be prevented by pilots maintaining situational awareness during all phases of flight. Synthetic Vision Technology (SVT) is a great situational awareness tool for avoiding CFIT accidents but the pilot must be attentive throughout the entire flight to avoid CFIT accidents. This is especially true when departing or descending through IMC or low-light conditions.

Completion Standards

- Promptly responds to the warning and initiates the TAWS escape maneuver,
- Maintains aircraft control throughout and after maneuver,

- Regains situational awareness,
- Communicates with ATC as necessary.

Common Errors

- Unable to navigate to MFD TAWS page,
- Intentionally ignores TAWS cautions or warnings.

Inadvertent Flight into IMC

Inadvertent flight into IMC by VFR and IFR rated pilots is a major contributing cause of fatal accidents. Pilots that fail to brief and interpret weather conditions or intentionally fly below low cloud bases are at the highest risk for unintentional flight into IMC.

Although prevention is the best way to avoid inadvertent flight into IMC, pilots must be able to maintain aircraft control while safely exiting IMC. The autopilot is a great tool for assisting pilots out of IMC. However, the pilot must be capable of using the proper autopilot modes to exit the conditions. Returning to the previous VMC is usually the best option. However, some situations will require alternative solutions to exit IMC. This is particularly true while scud running close to the ground and/or obstacles. Scud running close to the ground increases the risk for a CFIT or loss of control accident, which are typically fatal.

Training Limitations

- Abide by all legal altitude restrictions,
- Do not enter IMC unless on an IFR clearance,
- Flight below 500 feet AGL other than for takeoff or landing is not recommended,
- Do not put the aircraft on a direct collision course with obstacles or terrain other than normal descent to landing.

Procedure

- Announce the IMC encounter and have the pilot fly with a view-limiting device,
- Describe the weather situation for the intended scenario.

Recovery (Training)

- Remove view limiting device to simulate exiting IMC, or
- Instrument rated pilots obtain IFR clearance to continue.

Instructor Notes

Simulators and flight training devices that have high-quality visual systems are useful tools for creating inadvertent IMC scenarios. It is also possible to create realistic and safe scenarios in the aircraft. Obtain an IFR clearance with a block of altitude that allows climb or descent into the clouds. Have the pilot climb or descend into the IMC, then recover. This can be more effective during night operations.

Another IMC training option is to verbally announce the lower ceilings while flying to a destination. Expect the pilot to descend slightly and continue on. After a minute, have the pilot place a view limiting device on. Again, expect the pilot to descend. Once at a lower altitude allow the pilot to fly visually. After some time, announce that the pilot has re-entered the clouds. This scenario typically results in the pilot stepping down to an unsafe altitude. This scenario can be even more effective when the pilot has personal motivation to get to the destination.

Try combining this scenario into a dual purpose, business and training, flight where the pilot is intending to conduct actual business at the destination. Or, conduct this scenario on the last flight segment of the day when returning to the home airport. At this time, the pilot's mind will be focused on getting home and he or she will have a harder time making a decision to divert.

Allowing instrument rated pilots to file and receive an IFR clearance during this maneuver is a great training exercise.

Completion Standards

- Maintains aircraft control within applicable practical test standards,
- Uses autopilot correctly to assist in exiting IMC,
- Promptly and correctly changes heading and/or altitude to exit conditions,
- Seeks ATC assistance if necessary,
- Maintains situational awareness.

Common Errors

- Fails to maintain aircraft control by focusing on instrument scan,
- Fails to consider weather patterns when planning the exit strategy,
- Does not initiate a prompt exit strategy,
- Continues to climb into IMC even at safe altitudes and expects to escape by turning around.

Inadvertent Icing Encounter

The severity of an icing encounter is primarily affected by the rate of accumulation and the pilot's ability to quickly escape the icing conditions. Icing situations and scenarios are unlimited. Therefore, it is important to brief the factors that affect a pilot's exit strategy and practice different scenarios in flight. Icing scenarios can be a useful tool for developing a pilot's risk management skills. Many icing scenarios are solved by turning around or diverting to an alternate airport. Pilots often have trouble changing their original plans and choosing a safe alternative.

Pilots flying aircraft certified for flight-into-known-icing (FIKI) may fly through known icing conditions legally, but must exercise good judgement and be continuously aware of conditions to do so safely. Encourage pilots to fly with an instructor for the first time operating in known icing conditions. Pilots are often surprised by the additional workload and decisions that need to be made while intentionally flying through known ice.

Include a takeoff into known icing simulation or real life scenario with ALL pilots training in FIKI aircraft.

The 'No Hazard' system installed on many Cirrus aircraft is not safe or legal to fly through known icing conditions. The system may or may not be a useful tool to prevent or eliminate ice buildup on protected surfaces. It is a tool to assist pilots in escaping icing conditions that were inadvertently encountered.

Icing scenarios typically apply to instrument rated pilots. However, an inadvertent icing encounter could be combined with an inadvertent IMC encounter when training VFR pilots.

To make icing scenarios more realistic simulate the loss of performance by restricting and reducing power. Over time, the instructor may reduce power enough that level flight cannot be maintained. This would simulate severe icing conditions or prolonged flight in moderate conditions.

Training Limitations

- Limit icing scenarios to airspace that allows pilot decisions to be carried out through safe completion or recovery,
- Do not intentionally fly a 'No Hazard' equipped aircraft into known icing conditions,

- Do not fly a FIKI equipped aircraft into conditions that will exceed system performance or intended use.

Procedure

Here are a few suggestions for inadvertent icing encounter scenarios:

Scenario 1- Shortly After Takeoff

Depart on a simulated or actual IFR flight with simulated or actual weather conditions below basic VFR minimums. Shortly after entering the clouds on departure announce that the OAT has dropped to near freezing. Monitor the pilot to see if he or she includes the wing in his or her routine scan and verifies that the pitot heat on. Shortly after, announce that ice is accumulating on the wing. Pilots will be faced with a tough decision; to return to the airport, or to climb on top of icing conditions. Either option may be correct given a variety of circumstances. Announcing a recent pilot report with cloud tops can make the scenario and pilot's decision more elusive or straightforward. For pilots flying FIKI equipped aircraft, announce that ice has accumulated on protected services before the system was on or that the system is not keeping up.

Scenario 2- En Route and/or High Altitude

While in simulated or actual IMC in cruise announce that the OAT has dropped to near freezing temperatures. Monitor the pilot to see if he or she includes the wing in his or her routine scan and verify that the pitot heat is on. Ask the pilot what factors he or she considers when developing an exit strategy. Customize a weather scenario that leads him or her to request a climb or descent. The instructor, playing the role of ATC, should deny the initial request for climb or descent with the intent of having the pilot assertively inform what is necessary for safe flight.

Limit and reduce power to simulate degraded performance if the pilot fails to respond to the situation in a timely manner or makes a poor decision to continue in icing conditions.

Scenario 3- Descent to Landing

Simulate an IFR cross-country flight and provide all ATC services and clearances to the pilot. Mimic ATC as closely as possible. During the descent to the destination airport announce that the aircraft has entered the clouds and is picking up substantial ice. The reported weather is at approach minimums. The pilot will be faced with a decision to divert when he or she is close to the intended destination.

If the pilot decides to continue, provide him or her with an extended vector to follow traffic, which will increase the icing exposure time. Start limiting and reducing power gradually to simulate the loss of performance. Eventually reduce and limit the power until level flight above 100 KIAS cannot be maintained.

Recovery (Training)

- Verbally announce the icing conditions have been exited and that scenario is over, or
- Take control of the aircraft once consequences of poor decisions are understood by the pilot.

Completion Standards

- Scans for ice accumulation in possible icing conditions,
- Turns pitot heat ON in possible icing conditions,
- Switches to alternate induction air,
- Switches to alternate static source,
- Uses available anti-ice and de-ice systems aboard the aircraft to shed or prevent ice accumulation,
- Promptly exits icing conditions considering pertinent weather information and IFR minimum altitudes,
- Does not allow personal motivation or pressure to influence pilot into a poor decision,
- Maintains aircraft control within applicable instrument practical test standards.

Common Errors

- Allows decisions to be influenced by personal motivations and accepts undue risk,
- Fails to monitor for ice accumulation,
- Fails to seek help or information from ATC,
- Fails to develop and execute an icing exit strategy promptly resulting in excessive ice accumulation,
- Fails to use the autopilot during periods of high workload and additional stress.

Diversion

A diversion means the pilot has decided the risk of continuing to the intended destination is too great and cannot be mitigated. This is never an easy decision to make. The situation often starts with a series of bad decisions that lead to an accident because the pilot's judgement was influenced by his or her motivation to get to the original destination.

Some reasons to divert include a change in weather, inadequate fuel reserves, equipment malfunctions, passenger discomfort, or pilot fatigue. Whatever the reason, pilots must be capable of recognizing an unsafe situation, implementing risk management strategies, and developing a plan that allows a safe outcome.

The skill of performing a diversion may be difficult for some pilots to master, especially if the diversion airport is relatively close by. Pilots that are not proficient controlling the avionics will have difficulty performing the diversion. Review basic avionics skills before performing a high workload diversion.

Once basic skills are demonstrated, create a scenario that tests and develops a pilot's risk management skills. Diversion scenarios do not have to be elaborate or complex, but must include real life situations. To truly test one's ability to manage risk effectively, the pilot must be motivated to complete the flight as intended. This presents the greatest challenge for the instructor during flight training.

Pilots often make different decisions in real life scenarios versus what is seen while training because their motivations are different. Integrating training into a pilot's personal or business purposes can help increase a pilot's motivation and commitment to getting to the destination.

Another effective scenario is to ask the pilot if he or she minds dropping a friend off at an airport during training. Even though the pilot may not know the instructor's friend, he or she will feel additional motivation to get the friend to his or her destination. During the flight introduce a scenario that requires the pilot to consider a diversion.

Training Limitations

- Adhere to all flight regulations,
- Never jeopardize the safety of flight.

Procedure

Here are some scenario examples that often lead to diversions. See the Inadvertent Icing section for additional guidance.

Scenario 1- Reported High Winds and/or Wind Shear

Select an airport destination that has a single runway or parallel runways with weather reporting. When the pilot checks destination weather information announce winds that exceed the pilot's crosswind landing capabilities and/or aircraft maximum demonstrated crosswind. If the pilot continues to the destination, announce that a jet or two executed a missed approach due to wind shear encountered on short final.

Take control of the aircraft on short final if the pilot elects to continue to land in the unsafe conditions. Once on the ground, calmly and considerately ask the pilot why he or she thought it was safe to continue. Discuss possible outcomes and look for future opportunities with high crosswinds to help the pilot recognize his or her and aircraft's capabilities.

Scenario 2- Weather Below Approach Minimums

This scenario is slightly more complex and requires some amount of setup. It starts with a longer cross-country flight or a shorter flight that departs with less fuel. Provide the pilot with a weather overview including conditions that require an alternate to be filed. Dictate conditions so that the alternate airport just meets minimum fuel requirements.

Announce deteriorating weather near or below approach minimums while en route when the pilot checks destination weather, or prompt if necessary.

Encourage the pilot, if necessary, to review Fuel Over Destination and to calculate fuel remaining at the filed alternate. Announce to the pilot that only 30 minutes of fuel remain at the alternate and that its weather has also been deteriorating.

Allow the pilot to continue or divert. If he or she continues to the destination, do not let him or her go visual for a landing. While holding or following the missed instructions, announce that a business jet just landed on the same approach, but weather was reported unchanged. Simulate weather below approach minimums on this approach as well. This will further reduce fuel reserves.

Hopefully, the pilot will elect to proceed to the alternate and will reduce fuel burn to extend range. Also, the pilot should review the actual weather information and approaches available at closer airports to further mitigate risk.

Scenario 3- Open Door on Takeoff

Although a simple scenario, leaving a door open for takeoff or opening a door shortly after rotation creates both a distraction and decision for the pilot during a busy phase of flight. Introduce the scenario as a cross-country flight that is running late. Pilots must first commit to the decision to return for a landing and focus attention on maintaining aircraft control simultaneously.

Completion Standards

- Overcomes personal motivation and pressure and makes a safe and prudent decision,
- Maintains aircraft control within applicable completion standards,
- Uses all information available to make a safe decision,
- Uses the autopilot effectively to reduce workload during periods of high workload or stress,
- Uses onboard resources to find diversion airport information.

Common Errors

- Fails to recognize the severity of poor decisions,
- Does not recognize an error chain and consequences,
- Fails to reason and/or maintain aircraft control during periods of high workload or increased stress,
- Neglects to use cockpit resources to aid in decision making.

System Malfunctions Overview

Instructor Notes

Simulating the following system malfunctions will allow the instructor to assess a pilot's knowledge of that system and how it relates to other systems in the aircraft. It will also allow the pilot to further develop risk management skills.

It is important that the pilot is able to describe system components, component integration, failure modes, and pilot techniques before attempting to practice failures in flight.

Repetition in a non-scenario-based format is recommended for pilots who need more time on task in order to recognize and handle a system failure. Once basic skills are mastered it is appropriate to create a scenario with the system failure that causes the pilot to exercise risk management skills.

Simulators or flight training devices are excellent tools when training pilots to handle system failures. They allow the instructor to create realistic component failures and allow scenarios to be carried out uninterrupted en route.

Flap Malfunction

A malfunction in the flap system typically results in the flaps failing to extend prior to approach or landing. Pilots must be aware of the additional landing distance required due to the higher stall and approach speeds. Pilots are encouraged to select a landing runway that is at least 5000 feet long for 0% flap landings. A diversion may be necessary if the runway at the intended destination is not adequate for a safe landing.

Pilots are encouraged to practice reduced flap landings during initial and recurrent training.

Training Limitations

- Reset the circuit breaker before conducting takeoff or landing practice,
- Minimum runway length is 5000 feet for zero flap takeoff and landing practice,
- Flaps may be failed in IMC as long as the destination ceiling and visibility is greater than 1000 feet AGL and 3 SM.

Procedure

- Pull flap circuit breaker en route (preferred), or
- Block flap control when pilot reaches for flap and announce the flaps are inoperative,
- Reset flap circuit breaker before takeoff or landing practice.

Recovery (Training)

- Restore the flap circuit breaker and announce the scenario conclusion.

Instructor Notes

Failing the flaps in the up position is a good way to test a pilot's ability to conduct a zero flap landing. It can also be a risk management exercise. Plan a flight to an airport with a 3000 - 3500 feet runway and fail the flaps en route by pulling the flaps circuit breaker. Do this without the pilot's knowledge (see the *Guidance on Pulling Circuit Breakers* section for more information). The pilot will be faced with a decision to divert to the departure or alternate airport, or accept higher risk and attempt a landing at the intended destination. Take control of the aircraft on short final if the pilot decides to attempt a landing. Proceed to a runway that is 5000 feet or greater and record landing distances. Pilots will be surprised by the distance required for stopping.

Pulling the flap circuit breaker is a more effective scenario than simply announcing the flaps are inoperative. Pilots often fail to realize the flap failure in the traffic pattern or during an IAP. This scenario will help the pilot detect flap malfunctions in the future.

Completion Standards

- Recognizes the failure after attempting to extend 50% flaps,
- Adjusts speed as necessary to perform a zero flap landing,
- Considers landing distance and selects an appropriate runway for a safe landing,
- Adheres to applicable landing completion standards.

Common Errors

- Fails to recognize the flap malfunction and continues landing unknowingly,
- Knowingly attempts a landing on a short runway with inadequate safety margins,
- Lacks the skills to perform a zero flap landing within applicable completion standards.

Oxygen System Malfunction

All pilots flying an oxygen and/or turbo equipped Cirrus aircraft are encouraged to attend hypoxia training every 5 years. Information about facilities that offer this training can be found on the Cirrus Training Portal. Be cognizant of hypoxia signs and symptoms and continuously monitor oxygen saturation levels with a pulse oximeter when operating at altitudes that require the use of supplemental oxygen.

It is critical to ensure adequate oxygen is available for the intended flight considering altitude and passengers. Careful preflight of all regulators, masks, cannulas, oxygen flow, hoses, and connections is required.

An O_2 malfunction at high altitude is an emergency situation requiring immediate and decisive action by the pilot. If supplemental oxygen is not available at high altitude, an emergency descent must be initiated. Consider using the autopilot in IAS mode set to V_{NO} with the altitude bug set to 10,000 feet MSL, or higher if terrain dictates.

• WARNING •

Intentionally removing supplemental oxygen at or above altitudes where supplemental oxygen is required by regulation is reckless and unsafe. The supplemental oxygen system will remain on during all O_2 malfunction scenarios. These scenarios are intended to teach pilots how to respond to various oxygen failures, not to demonstrate hypoxia signs, symptoms, and recovery.

Training Limitations

- Malfunction limited to VFR in airspace and terrain that allows an emergency descent to a minimum of 12,500 feet MSL,
- Oxygen system and masks or cannulas will remain on at all altitudes that require supplemental oxygen.

Procedure

- Clear area visually and with the traffic alert system before initiating the scenario,
- Announce an oxygen system malfunction, quantity exhaustion, flow blockage, or O_2 warning annunciator, or

- Display physical signs of hypoxia, such as unresponsiveness, loss of consciousness, euphoria, and/or slurred speech. Announce failure once pilot recognizes the issue.

Recovery (Training)

- Continue flight at altitudes that do not require supplemental oxygen, or
- Announce the scenario conclusion and climb back to the desired altitude.

Instructor Notes

Pilots learning to fly a turbo-equipped Cirrus should conduct and demonstrate the ability to handle an O_2 Malfunction. Perform this scenario during a high altitude (greater than 12,500 feet MSL), simulated IFR, cross-country leg. This scenario can lead into emergency descent training or evaluation. The instructor will provide all IFR clearances, pilots should declare an emergency to the instructor as they would to ATC.

Perform this procedure in airspace and terrain that allows an emergency descent to at least 12,500 feet MSL or below. Descending to 10,000 feet MSL is preferred. This may be conducted in VMC or simulated IMC while VFR. It is recommended to start this malfunction at an altitude that allows the pilot sufficient time to become stabilized in an emergency descent.

Completion Standards

- Promptly responds to the malfunction and initiates an emergency descent to a safe altitude,
- Declares an emergency when workload permits and coordinates with ATC as required,
- Recognizes signs and symptoms of hypoxia in passengers and responds accordingly.

Common Errors

- Does not understand the severity of an oxygen system malfunction at high altitude,
- Fails to perform an emergency descent as described in the emergency descent completion standards.

Power Lever Linkage Failure

A stuck throttle results from a linkage failure between the power lever and the throttle plate. The power may be at a high or low power setting. Individual circumstances dictate the proper reaction by the pilot.

When the power is stuck low and the aircraft is unable to sustain level flight, the pilot should establish the aircraft at best glide speed and prepare for an emergency landing. CAPS should be considered and activated above 2,000 feet AGL when the successful outcome of a forced landing is in doubt.

A stuck throttle with a high power setting will require the pilot to perform a power-off landing. The pilot should position the aircraft within safe gliding distance from the airport, a runway greater then 5,000 feet is recommended, and then shut the engine off with the mixture control and establish best glide. The pilot may enrichen the mixture to restart the engine if it appears the aircraft will come up short to the runway.

Pilots who are not confident in their ability to perform this procedure should consider CAPS as an alternative to the power-off landing.

Training Limitations

- Conduct takeoff scenarios on a runway that is a minimum of 3 times the required takeoff ground roll distance,
- For takeoff scenarios, abort the takeoff before the aircraft accelerates to 35 KIAS,
- For takeoff scenarios, limit the throttle travel to a maximum of 30-40% power,
- For landing scenarios, discontinue the scenario and use full power to execute a go-around if a stabilized approach to a landing cannot be established by 500 feet AGL,
- Perform this maneuver in VMC only,
- Obtain the necessary clearances and coordinate accordingly with ATC if necessary,
- Do not shut the engine down with the mixture control.

Procedure - Instructor

1. Limit throttle travel by blocking movement on takeoff or during power reductions,

Procedure

1. Power Lever Movement..VERIFY

   Sweep the power lever slowly to determine if any control remains.
2. Power .... SET if able
3. Flaps ....SET if needed

   With a high power setting, consider decreasing airspeed by increasing the aircraft's pitch to flap speeds. Set flaps as desired and continue descent.
4. Mixture .... AS REQUIRED (full rich to cut-off)

   To perform a landing with a stuck throttle, the engine will need to be shut off via the mixture control. It is best to position the aircraft within safe gliding distance before turning the engine off.
5. Land as soon as possible.

   A stuck throttle should be treated as an emergency situation. Inform ATC of situation and request assistance and priority handling as necessary. Be prepared for a power-off landing.

Recovery (Training)

- Announce scenario conclusion and allow free throttle movement.

Instructor Notes

A simulated stuck throttle scenario often catches pilots by surprise and can be a good way to assess a pilot's ability to think and react quickly in an increased stress environment.

Conduct this failure by limiting throttle travel when the pilot is reducing the throttle for descent and arrival. Allow the pilot to reduce power to approximately 65% before blocking and announcing the stuck throttle.

This failure can also be simulated early in the takeoff roll by restricting the throttle lever at approximately 30-40%. Do not allow the aircraft to accelerate past 35 KIAS and promptly take aircraft control if the pilot fails to abort the takeoff.

An actual stuck throttle with a high power setting would require the pilot to shut down the engine with the mixture control when the aircraft is in a position to make a stabilized power-off approach to landing. The mixture control must remain in the proper position for landing throughout the simulated scenario. Do not shut down engine using the mixture control. Simulate shutting the engine down by reducing the throttle to idle.

Completion Standards

- For takeoff scenario, promptly reduces throttle to idle and applies brakes as required to stop the aircraft on the runway,
- For landing scenario, simulates notifying ATC of emergency and requests assistance as necessary,
- For landing scenario, reduces risk by selecting a larger runway,
- For landing scenario, puts the aircraft into a position where a stabilized approach to a power-off landing can be accomplished,
- For landing scenario, considers methods of extending glide distance or performing a go-around if necessary.

Common Errors

- Does not consider engine shutdown and power-off approach for resolving scenario,
- Fails to abort takeoff promptly,
- Fails to execute a power-off approach within applicable completion standards.

Loss of Brake Pressure

Pilots are encouraged to check brakes before taxi and during the descent checklist during each flight operation as detailed in the normal procedures checklist. In the event of a loss of brake pressure during taxi, the engine should be shutdown before the aircraft comes into collision hazard with objects on the ground. The aircraft should be towed and repaired prior to flight or self-propelled movement on the ground.

If brake pressure is lost during flight, select a wide runway that is at least 5,000 feet in length. Notify ATC of the failure to ensure landing separation is accounted for. Touchdown close to the approach end of the runway with minimum speed. For a single brake failure, land on the side of runway corresponding to the failed brake. Use rudder to steer and counteract the forces of the remaining brake. Discontinue braking when rudder authority no longer over controls the single remaining brake.

Training Limitations

- Discontinue scenario and apply brake pressure as necessary to avoid collision or runway overrun,
- Practice no-brake landings at a runway that is at least 5,000 feet,
- Limit failure to VMC.

Procedure

- Announce failure during taxi or during the descent checklist.

Recovery (Training)

- Announce scenario conclusion and apply brakes as necessary.

Instructor Notes

A loss of brake pressure may be simulated on the ground during taxi or in flight while completing the descent checklist.

While taxiing in a non-movement area with no conflict to other ground vehicles or traffic, announce the brake failure. Tell the pilot to put his or her heels on the floor so that no brake pressure may be applied. Allow the pilot to actually shut the engine down to stop forward movement.

While in flight announce the loss of brake pressure while completing the descent checklist. Picking a destination with short runways is a good scenario to evaluate the pilot's risk management skills. Inform the pilot that the landing will be made with no brakes or a single brake.

Completion Standards

- For taxi scenario, adheres to the Brake Failure During Taxi checklist procedures as necessary,
- For taxi scenario, shuts the engine down and stop the aircraft forward movement when necessary,
- For landing scenario, selects an appropriate runway for performing a no-brake landing,
- For landing scenario, references the Landing with Failed Brakes checklist procedure,
- For landing scenario, simulates informing ATC of malfunction and requests assistance as necessary,
- Lands on correct side of the runway for a single brake failure and maintains directional control.

Common Errors

- For taxi scenario, fails to shut engine down and collides with ground structures,
- For landing scenario, fails to pump the brakes to restore pressure,
- For landing scenarios, fails to select an adequate runway,
- Fails to land on correct side of the runway for a single brake failure.

Open Door

Doors that close hard or open in flight require service. When properly adjusted, Cirrus doors will remain closed and are easy to operate. It is recommended to close the passenger door from outside the aircraft when flying with infrequent flyers. Always check the upper and lower latches of each door before departure and listen for increased cabin noise during the engine run-up to identify an improperly shut door.

Although an open door is undesirable due to the increase in cabin noise, possible decrease in temperature, and possible precipitation in the cabin, the aircraft handling characteristics are unchanged. It is not possible to close the door in flight due to the aerodynamic forces. It is recommended to land and stop the aircraft to close the door if the door opens in flight or was left open during departure. This is not an emergency landing. Pilots should use normal power settings, speeds, and aircraft configuration for landing. Do not become overly distracted by the open door and focus on maintaining aircraft control.

Training Limitations

- Perform at a runway that is at least 3 times the takeoff ground roll distance,
- Perform at an airport that allows a return to landing without unnecessary burden to ATC or other traffic.

Procedure

- Leave one or both door latches open during takeoff roll.

Recovery (Training)

- Return to airport, land, and secure door.

Instructor Notes

Opening a door shortly after rotation or leaving a door unlatched for takeoff is a good method to test the pilot's ability to prioritize responsibilities: maintain aircraft control, navigate the aircraft as required, and communicate intentions with ATC.

• Note •

A door that opens in flight or that is difficult to close is not properly aligned and should be adjusted by a Cirrus Authorized Service Center.

The desired response of the pilot is to either abort the takeoff, if safe, or return for a landing to secure the door. Inform ATC when practicing at a towered airport and receive approval for additional time on the runway.

It is very difficult to open the door in flight with airspeeds above 80 KIAS. For this reason, open the door during the takeoff ground roll or shortly after rotation only.

Guard the flight controls and throttle closely during this procedure to ensure aircraft control is maintained at all times. Take aircraft control when necessary for safe flight.

Performing this maneuver will help pilots become acutely aware of improperly closed doors during normal operations.

Teach pilots to load passengers and shut the passenger's door from outside the aircraft. This will help ensure that all doors are properly secured before takeoff.

Completion Standards

- Maintains aircraft control,
- Communicates intentions to ATC and returns for a landing,
- Listens for signs of an open door during run-up and early in the takeoff roll,
- Aborts takeoff only when sufficient runway remains for stopping without excessive brake pressure.

Common Errors

- Becomes preoccupied with open door and loses focus on primary pilot responsibilities,
- Attempts to slow and close door in flight.

Runaway Trim

A runaway trim scenario can develop a pilot's ability to recognize and recover from a runaway trim situation. Perform this scenario by applying roll or pitch pressure on the control stick when the pilot is hand-flying or trimming continuously in one direction. Using a knee to add control pressure will increase the realism of the scenario. Allow the pilot to overpower the applied pressure but keep roll or pitch pressure applied until the pilot pulls the respective roll or pitch trim circuit breaker.

Perform this failure in airspace that allows for deviations in heading and course, or altitude. Discontinue the maneuver by relaxing pressure if aircraft control cannot be maintained by the pilot.

It is also recommended to conduct this failure either early in the flight, where the pilot can return to departure airport if possible, or late in the flight where hand-flying without trim will not become excessively fatiguing.

Increase and adjust applicable performance completion standards by 50% when flying with a roll trim or pitch trim circuit breaker 'popped'. For example, the normal altitude tolerance for the traffic pattern downwind leg is +/-100 feet. Increase the tolerance to +/-150 feet while flying without pitch or roll trim.

Training Limitations

- Closely guard controls when landing without roll or pitch trim,
- Do not simulate failure when airspace or clearances require precise heading, course, or altitude control,
- Limit simulation to VFR or simulated IMC.

Procedure

- Apply roll or pitch pressure to side stick with knee or hand,
- Allow pilot to overpower pressure to maintain aircraft control,
- Relax pressure when pilot pulls the correct roll or pitch trim circuit breaker or presses the A/P Disc button on the control yoke.

Recovery (Training)

- Announce scenario conclusion and restore roll or pitch trim circuit breaker, re-trim aircraft.

Completion Standards

- Adds control inputs necessary to maintain aircraft control,
- Presses and holds the autopilot disconnect button,
- Identifies the correct faulty trim motor, pitch or roll, and pulls the respective circuit breakers without entering an unusual attitude,
- Maintains aircraft control within adjusted completion standards for the specific maneuver, phase of flight or procedure being performed.

Common Errors

- Fails to maintain aircraft control while pulling the respective circuit breaker,
- Fails to maintain aircraft control within adjusted completion standards while flying out of trim.

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Section 5
Maneuvers

General

Follow these guidelines for set up and execution of the following maneuvers. During these maneuvers, pilots should be alert to available forced landing areas. The area chosen should be clear of any obstacles or terrain and away from communities, livestock, or groups of people to prevent possible annoyance or hazards to others.

Reference the Airplane Flying Handbook FAA-H-8083-3a for more information.

Minimum Recovery Altitude

- Performance maneuvers, slow flight, and stalls should be performed with a minimum recovery altitude of 1,500 feet AGL,
- Ground reference maneuvers should be performed at 1,000 feet AGL or applicable traffic pattern altitude.

Mixture Control

For all maneuvering flight, the mixture should be set to allow maximum power if needed.

- SR20 - Set mixture full rich
- SR22 - Set mixture per the Max Power Fuel Flow placard or the top of the green arc on the fuel flow gauge
- SR22TN - Set mixture full rich
- SR22T - Set mixture full rich

Instructor Notes

Practicing maneuvers is required for pilots preparing for new ratings or certificates. Maneuvers help pilots master aircraft control and can play an important role for pilots learning to fly a new aircraft model. Mastering various maneuvers can help develop fundamental stick and rudder skills, division of attention skills, and prepare pilots to deal with unusual circumstances.

Pilots often focus attention excessively inside the cockpit when new maneuvers are introduced. It is often helpful to dim the avionics while performing maneuvers to force pilots to look outside the aircraft and develop visual reference points. Pilots who are acutely aware of aircraft attitude through outside visual references are often less likely to have airspeed and aircraft control issues during traffic pattern and landing operations.

It is often helpful to demonstrate a maneuver for the first time. Highlight outside visual references, flight and rudder control inputs, and power changes during the maneuver.

Closely guard flight controls, throttle control, and rudder pedals during all maneuvers and take over aircraft control whenever an immediate safety-of-flight hazard exists.

Practice maneuvers away from congested areas. Clear the area by performing two 90-degree clearing turns while visually scanning for traffic conflicts. Supplement visual collision avoidance techniques with a traffic alert system, if installed. Maintain a heightened sense of awareness for traffic conflicts when maneuvering.

Private pilots looking to further develop their stick and rudder skills will benefit by learning and practicing various commercial maneuvers such as Chandelles, Lazy Eights, or Steep Turns. Combining these maneuvers during flight reviews or recurrent training events can be new and exciting for private pilots or a good refresher for commercial/ ATP pilots.

Steep Turns (Private and Commercial)

Enter this maneuver at 120 KIAS by smoothly banking the aircraft to 45 degrees (Private) or 50 degrees (Commercial) and simultaneously adding back pressure to maintain altitude. Maintain coordination with rudder. Additional power may be necessary to maintain airspeed. Continue the turn for 360 degrees. Start the roll out approximately 10 degrees before completing the full turn and simultaneously release back pressure. Reduce any power that was added during the maneuver.

Limitations

- Minimum recovery altitude: 1,500 feet AGL,
- VMC only.

Execution

- Execute clearing turns,
- Airspeed 120 KIAS,
    - SR20 - 60% Power / 21" MP (approximately),
    - SR22 - 30% Power / 18" MP (approximately),
    - SR22TN - 55% Power / 20" MP (approximately),
    - SR22T - 50% Power / 18” MP (approximately).
- Bank Angle 45° (Private) or 50° (Commercial).

Recovery

- Smoothly roll out on desired heading while relaxing elevator back pressure to maintain altitude,
- Reduce power to maintain airspeed,
- Continue flight as desired.

Instructor Notes

It is common for pilots to have difficulty performing turns in a particular direction, usually to the right. This is primarily due to the different visual picture between left and right turns. Demonstrate turns to highlight the proper pitch attitude during the maneuver.

Instrument pilots will find the Flight Path Indicator a useful tool when conducting instrument steep turns. Keep the flight path indicator centered on the PFD horizon line to keep the aircraft at a zero rate of climb or descent throughout the maneuver.

Completion Standards

- Exhibits knowledge of the elements related to this maneuver and complies with limitations, execution, and recovery procedures described in this manual,
- Maintains altitude +/-100 feet, airspeed +/-10 KIAS, bank angle +/- 5 degrees, and rolls out on entry heading +/-10 degrees,
- Maintains 45 degree (private), or 50 degrees (commercial),
- Divides attention between outside visual reference and instrument scan (VMC),
- Maintains aircraft coordination during maneuver,
- Smoothly rolls into opposite direction turn as requested by instructor.

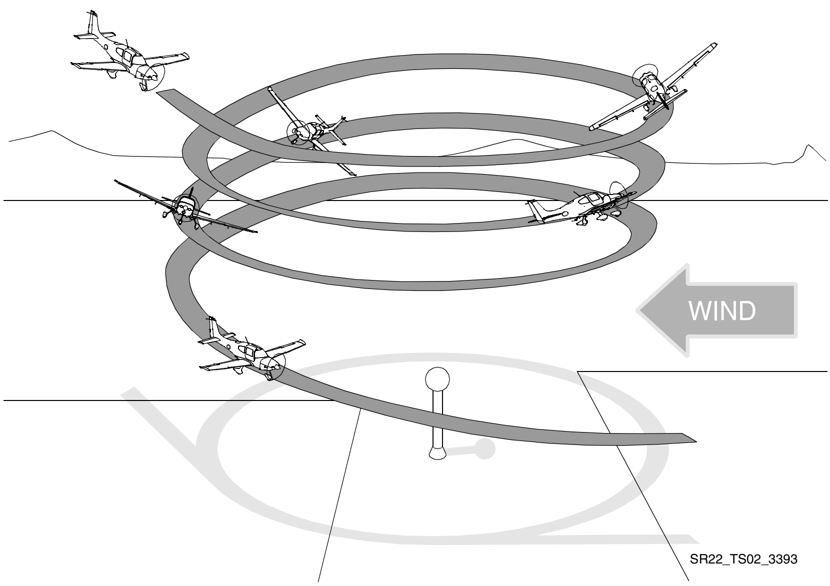
Common Errors

- Adds excessive elevator back pressure while rolling into bank causing the aircraft to climb and lose airspeed,
- Over-banks or excessively changes angle of bank, causing altitude and airspeed fluctuations,
- Fails to reduce back pressure and/or reduce power-on maneuver rollout causing the aircraft to climb and/or accelerate,
- Uses abrupt and excessive control inputs.

Steep Spirals (Commercial)

A steep spiral is a constant gliding turn, during which a constant radius around a point on the ground is maintained, similar to the turns around a point maneuver. The radius should be such that the steepest bank will not exceed 60 degrees. Start the maneuver at 3,000 feet AGL or higher so that the spiral may be continued through a series of at least three 360-degree turns.

Operating the engine at idle speed for a prolonged period during the glide may result in excessive engine cooling or spark plug fouling. The engine should be cleared every 1,000 feet by briefly advancing the throttle to normal cruise power, while adjusting the pitch attitude to maintain a constant airspeed. Preferably, this should be done while headed into the wind to minimize any variation in groundspeed and radius of turn.



Steep Spirals

Limitations

- Minimum recovery altitude 500 feet AGL unless safety or regulations dictate higher, or if a stabilized approach to landing can be made,
- Limit bank angle to 60 degrees,

- Limited to VMC.

Execution

- Reduce throttle to idle,
- Adjust aircraft pitch to maintain altitude until V_G is reached,
- Lower nose to maintain V_G over the selected reference point,
- Adjust bank angle as necessary to fly a constant radius over selected reference point.
- Clear engine every 1,000 feet,
- Complete a minimum of at least three, 360-degree turns.

Recovery

- Add power as necessary and climb to desired altitude, or
- Continue landing if a stabilized approach to landing can be maintained.

Instructor Notes

Completing a steep spiral to a stabilized approach and landing is a good way to develop skills necessary to conduct emergency landings. Conduct this maneuver during commercial pilot training and when completing recurrent training or a flight review with pilots.

The pilot should be in charge of clearing the engine during this maneuver. It is also beneficial to have the pilot control radio communication if the maneuver will be conducted over an airport.

Completion Standards

- Selects an altitude sufficient to continue through a series of at least three 360-degree turns,
- Selects a suitable ground reference point,
- Applies wind-drift correction to track a constant radius circle around the selected reference point with bank not to exceed 60 degrees,
- Divides attention between airplane control and ground track, while maintaining coordinated flight,
- Maintains V_G +/-10 KIAS, rolls out toward object or specified heading +/- 10 degrees,

- Positions aircraft for a stabilized approach to landing and completes a power-off landing within applicable completion standards.

Common Errors

- Fails to maintain constant airspeed resulting in ground speed changes and difficulty maintaining a constant radius,
- Fails to decrease bank angle sufficiently on the upwind side to prevent getting blown over the reference point,
- Fails to account for wind changes throughout the descent,
- Mis-judges descent rate and fails to position the aircraft for a stabilized approach to landing if a landing was attempted.

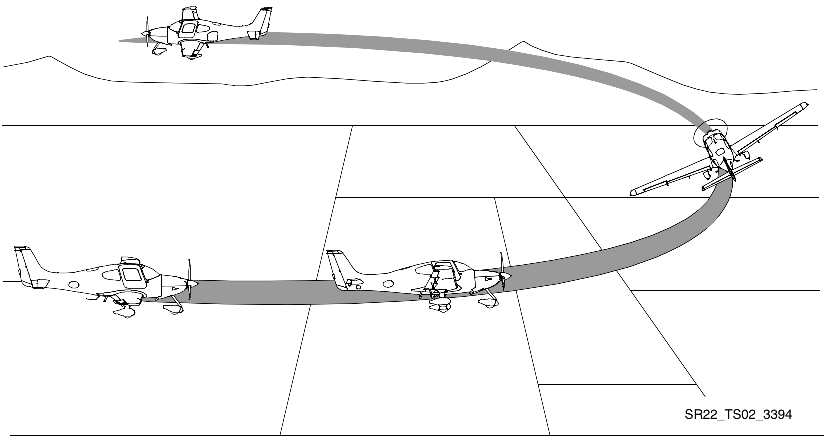
Chandelle (Commercial)

A chandelle is a maximum performance climbing turn beginning from approximately straight-and-level flight, and ending at the completion of a precise 180 degree turn in a wings-level, nose-high attitude at the minimum controllable airspeed. The maneuver demands that the maximum flight performance of the airplane be obtained; the airplane should gain the most altitude possible for a given degree of bank and power setting without stalling.

Since numerous atmospheric variables beyond control of the pilot will affect the specific amount of altitude gained, the quality of the performance of the maneuver is not judged solely on the altitude gain, but by the pilot's overall proficiency as it pertains to climb performance for the power and bank combination used, and to the elements of piloting skill demonstrated.

Prior to starting a chandelle, the flaps should be in the UP position, power set for 120 KIAS, and the airspace behind and above clear of other air traffic. The maneuver should be entered from straight-and-level flight at 120 KIAS. After the appropriate airspeed and power setting have been established, the chandelle is started by smoothly entering a coordinated turn with an angle of bank appropriate for the airplane being flown. Increase to full power as the climb is initiated.

Normally, this angle of bank should not exceed approximately 30 degrees. After the appropriate bank is established, a climbing turn should be started by smoothly applying back-elevator pressure to increase the pitch attitude at a constant rate and to attain the highest pitch attitude as 90 degrees of the turn is completed. Apply rudder inputs to maintain coordinated flight throughout the maneuver.



Chandelle

Limitations

- Minimum recovery altitude 1,500 feet AGL
- Limited to VMC.

Execution

- Clear area around and above the aircraft,
- Maintain and note heading,
- Establish level flight at 120 KIAS,
    - SR20 - 60% Power / 21" MP (approximately),
    - SR22 - 30% Power / 18" MP (approximately),
    - SR22TN - 55% Power / 20" MP (approximately),
    - SR22T - 50% Power / 18” MP (approximately).
- Enter coordinated 30 degree level turn,
- Increase pitch at a constant rate to achieve max pitch halfway through the 180-degree turn while simultaneously adding full power,

- At the 90-degree point in the turn, maintain maximum pitch attitude while decreasing angle of bank at a constant rate to roll out wings level 180-degrees from starting heading,
- Hold the maximum pitch attitude momentarily at the 180-degree point, then reduce pitch to maintain level flight.

Recovery

- Reduce power to normal cruise power setting once aircraft has accelerated as desired.

Instructor Notes

Pilots often have difficulty maintaining coordinated flight during this maneuver due to the constantly changing airspeed and rudder effectiveness. It may be beneficial to limit power addition until coordination can be maintained. Be sure to practice this maneuver with turns in both directions due to the differences in rudder control inputs required and visual sight picture. Start the maneuver on a cardinal direction in a area with visual direction indicators if possible.

Completion Standards

- Starts and completes maneuver higher than 1,500 feet AGL,
- Enters the maneuver at 120 KIAS with flaps UP,
- Establishes a 30-degree left or right turn,
- Simultaneously applies power and pitch to maintain a smooth, coordinated climbing turn to the 90-degree point, with a constant bank angle,
- Begins a coordinated constant rate rollout from the 90-degree point to the 180-degree point maintaining full power and a constant pitch attitude,
- Completes rollout at the 180-degree point +/-10 degrees, just above a stall airspeed, and maintaining that airspeed momentarily while avoiding a stall,
- Resumes straight-and-level flight with a minimum loss of altitude.

Common Errors

- Establishes a maximum pitch that is too great, resulting in a stall condition,

- Fails to maintain coordination throughout maneuver,
- Fails to maintain a constant rate of pitch or bank changes during the appropriate phases of the maneuver,
- Fails to divide attention and look outside at visual reference points.

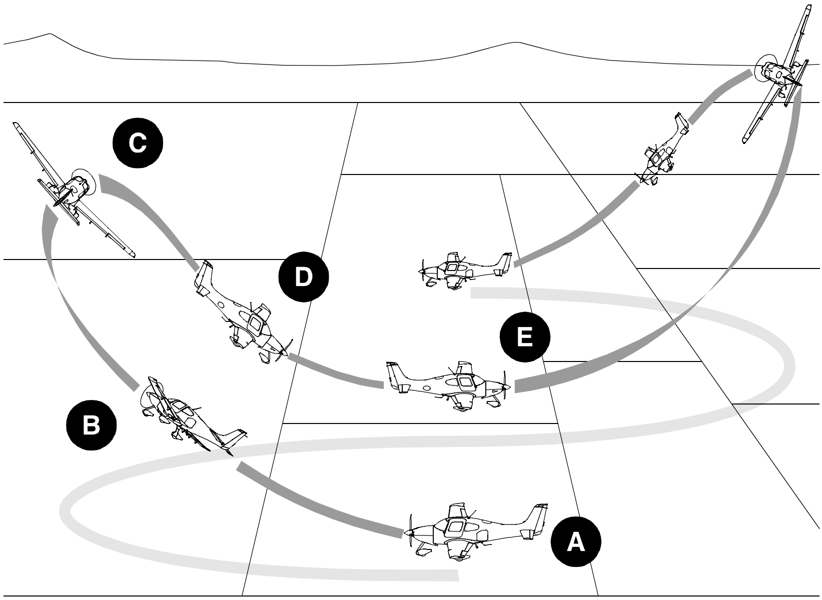
Lazy Eights (Commercial)

The lazy eight is a maneuver designed to develop perfect coordination of controls through a wide range of airspeeds and altitudes so that certain accuracy points are reached with planned attitude and airspeed. In its execution, the dive, climb, and turn are all combined, and the combinations are varied and applied throughout the performance range of the airplane. It is the only standard flight training maneuver during which at no time do the forces on the controls remain constant.

The lazy eight as a training maneuver has great value since constantly varying forces and attitudes are required. These forces must be constantly coordinated, due not only to the changing combinations of banks, dives, and climbs, but also to the constantly varying airspeed. The maneuver helps develop subconscious feel, planning, orientation, coordination, and speed sense. It is not possible to do a lazy eight mechanically, because the control pressures required for perfect coordination are never exactly the same.

A lazy eight consists of two 180-degree turns, in opposite directions, while making a climb and a descent in a symmetrical pattern during each of the turns. At no time throughout the lazy eight is the airplane flown straight and level; instead, it is rolled directly from one bank to the other with the wings level only at the moment the turn is reversed at the completion of each 180-degree change in heading. As an aid to making symmetrical loops of the “eight” during each turn, prominent reference points should be selected on the horizon. The reference points selected should be 45-degrees, 90-degrees, and 135-degrees from the direction in which the maneuver is begun.

Prior to performing a lazy eight, the airspace behind and above should be clear of other air traffic. The maneuver should be entered from straight-and-level flight at 120 KIAS. Power remains constant throughout the maneuver.



A ENTRY:
1. LEVEL FLIGHT
2. MANEUVERING OR CRUISE SPEED WHICHEVER IS LESS OR MANUFACTURER"S RECOMMENDED SPEED

B 45° POINT:
1. MAX. PITCH-UP ALTITUDE
2. BANK 15° (APPROX.)

C 90° POINT:
1. BANK APPROX 30°
2. MINIMUM SPEED
3. MAXIMUM ALTITUDE
4. LEVEL PITCH ATTITUDE

D 135° POINT:
1. MAX. PITCH-DOWN
2. BANK 15° (APPROX.)

E 180° POINT:
1. LEVEL FLIGHT
2. ENTRY AIRSPEED
3. ALTITUDE SAME AS ENTRY ALTITUDE

SR22_TS02_3392

Lazy Eights

Limitations

- Minimum recovery altitude 1,500 feet AGL,
- Limited to VMC.

Execution

- Clear area around aircraft,
- Flaps UP,
- Establish level flight at 120 KIAS,

  - SR20 - 60% Power / 21" MP (approximately),
  - SR22 - 30% Power / 18" MP (approximately),
  - SR22TN - 55% Power / 20" MP (approximately),
  - SR22T - 50% Power / 18” MP (approximately).
- Control the aircraft to achieve the following throughout the maneuver,
  - At the 45-degree reference, maximum pitch up attitude with approximately 15 degrees of bank,
  - At the 90-degree reference, maximum bank of 30 degrees with level pitch,
  - At the 135-degree reference, maximum pitch down attitude with approximately 15 degrees of bank,
  - At the 180-degree point, momentary level pitch and bank as the turn direction is changed,
  - Proper coordination,
  - Constantly changing pitch and roll rates.

Recovery

- Apply power as necessary to resume normal flight.

Instructor Notes

Pilots tend to rush through lazy eights or ‘force’ the maneuver to happen. This usually results in frozen pitch or roll rates or attitudes because the aircraft arrives at desired pitch or roll attitude before the intended reference point. Pilots should trim the aircraft before the start of the maneuver and use light forces on the control stick. A firm grip on the yoke usually results in the pilot over controlling the aircraft. Defining reference points before starting the maneuver is crucial. Ensure that pilots are dividing their attention between instrument scan and outside visual reference. The majority of scan time should be spent looking outside the aircraft.

Completion Standards

- Establishes the recommended entry configuration, power, and airspeed,
- Maintains altitude tolerance at 180-degree points, +/-100 feet from entry altitude,

- Maintains airspeed tolerance at the 180-degree point, +/-10 KIAS from entry airspeed,
- Maintains heading tolerance at the 180-degree point, +/- 10 degrees,
- Continues the maneuver through the number of symmetrical loops specified and resumes straight and level flight.

Common Errors

- Rushes through maneuver and requires non-constant rates of pitch or roll change to match desired reference points,
- Fails to monitor area for other traffic during maneuver,
- Uses erratic or rough control inputs, usually caused by attempts to counteract poor planning.

Maneuvering during Slow Flight

Practice this maneuver with a variety of flap configurations while climbing, descending, and turning. Enter the maneuver in level flight and smoothly reduce power. Maintain altitude while the aircraft slows to the desired airspeed and trim the aircraft. Add flaps as desired at V_{FE}. Add power as necessary to maintain the desired altitude. Maintain coordination throughout the maneuver with rudder control. Recover from this maneuver if a stall is encountered.

Limitations

- Minimum recovery altitude: 1,500 feet AGL,
- Limited to VMC.

Execution

- Execute clearing turns,
- Reduce power,
  - SR20 - 20% Power / 15" MP (approximately),
  - SR22 - 15% Power / 12" MP (approximately),
  - SR22TN - 25% Power / 12” MP (approximately),
  - SR22T - 30% Power / 12.5” MP (approximately).
- Flaps as desired (0% - 100%),
- Bank angle as desired (20° maximum),
- Airspeed - an airspeed at which any further increase in angle of attack, increase in load factor, or reduction in power would result in an immediate stall (current PTS standards),
- Power as required for level flight or desired climb or descent rate.

Recovery

- Reduce angle of attack and level wings,
- Apply full power,
- Flaps 50%,
- Accelerate to V_Y,
- Flaps 0%,
  - SR20 - 85 KIAS,

- SR22 - 80 KIAS.
- Clear of terrain and obstacles,
- Positive rate of climb.

Instructor Notes

Maneuvering during slow flight is an excellent maneuver to perform and master before attempting takeoff and landing practice. Emphasize precise airspeed control, pre-stall recognition, rudder coordination, and division of attention during this maneuver.

Have the pilot practice this maneuver in different configurations, making the correlation to traffic pattern operations and proper round-out and flare attitudes.

Be aware of rudder inputs made by the pilot during the maneuver. Pilots often neglect to apply rudder inputs during power additions while in slow flight.

Completion Standards

- Exhibits knowledge of the elements related to this maneuver and complies with limitations, execution, and recovery procedures described in this manual,
- (Private) Maintains altitude +/-100 feet, airspeed +10/-0 KIAS, bank angle +/- 10 degrees, desired heading +/-10 degrees,
- (Commercial) Maintains altitude +/-50 feet, airspeed +5/-0 KIAS, bank angle +/-5 degrees, desired heading +/-10 degrees,
- Accomplishes coordinated straight-and-level flight, turns, climbs, and descents with flap configurations specified by the instructor,
- Divides attention between visual references and instrument scan.

Common Errors

- Fails to maintain coordination during maneuver,
- Fails to recognize the signs of an impending stall,
- Fails to understand and apply proper power and pitch control inputs when changing or correcting airspeed and/or altitude deviations.

Power-Off Stalls

Practice this maneuver with varying flap configurations. Enter this maneuver from a level attitude by reducing the power and adding flaps as desired at V_{FE}. At 80 KIAS establish a descent of approximately 500 FPM, straight or turning. Once a stabilized descent is established, reduce power to idle and gradually increase pitch to a normal touchdown attitude (7.5 degrees approximately). Adjust pitch to reduce airspeed approximately 1 KIAS / second. Recovery can be initiated at the incipient phase or full stall.

Limitations

- Minimum recovery altitude: 1,500 feet AGL,
- Limited to VMC.

Execution

- Execute clearing turns,
- Flaps as desired (0% - 100%),
- Establish glide or gliding turn slowing to 80 KIAS,
  - SR20 - 20% Power / 15" MP (approximately),
  - SR22 - 15% Power / 12" MP (approximately),
  - SR22TN - 25% Power / 12" MP (approximately),
  - SR22T - 30% Power / 12.5” MP (approximately).
- Descent rate 500 fpm (approximately),
- 20° max bank angle,
- Reduce throttle to idle and increase pitch to a normal landing attitude (5° to 7.5°) and induce a stall.

Recovery

- Reduce angle of attack and level wings,
- Apply full power,
- Flaps 50%,
- Accelerate to V_Y,
- Flaps 0%,
  - Airspeed 80 KIAS (SR22) 85 KIAS (SR20),
  - Clear of terrain and obstacles,

- Positive rate of climb.

Instructor Notes

It is useful to make a correlation between a power-off stall setup and traffic pattern operations. Start on a heading and slow to traffic pattern speeds. Next, reduce power and add approach flaps to simulate being abeam the desired touchdown point. Start a 30-degree-bank turn while in a controlled descent and slow to 90 KIAS. Add full flaps and slow to 80 KIAS while continuing to descend. Turn another 90 degrees to simulate turning final approach and start reducing throttle and increasing back pressure to simulate round-out and flare. Hold elevator back pressure to induce a stall with the power at idle.

Initially, recover at the incipient phases while highlighting signs of the impending stall to develop stall recognition skills. This provides a good opportunity for go-around practice. Once stall recognition skills are developed and the pilot's recovery technique is correct, practice recovering from a full-stall condition. Practice recovering from straight or turning flight, with a maximum of 20 degrees of bank.

Highlight proper rudder control inputs during stall recovery. Pilots often neglect to apply sufficient rudder input while applying go-around power.

Completion Standards

- Exhibits knowledge of the elements related to this maneuver and complies with limitations, execution, and recovery procedures described in this manual,
- Describes factors that affect stall speed and situations where unintentional stalls are likely to occur,
- Transitions smoothly from the approach or landing attitude to a pitch attitude that will induce a stall,
- (Private) Maintains a specified heading +/-10 degrees in straight flight, maintains a specified angle of bank not to exceed 20 degrees, angle of bank +/-10 degrees in turning flight while inducing stall,
- (Commercial) Maintains a specified heading +/-10 degrees in straight flight, maintains a specified angle of bank not to exceed 20 degrees, angle of bank +/-5 degrees in turning flight while inducing stall,

- Recognizes and recovers promptly after the stall occurs by simultaneously reducing the angle of attack, increasing power to maximum allowable, and leveling the wings to return to a straight-and-level flight attitude with a minimum loss of altitude,
- Retracts flaps from 100% to 50% once the descent has been stopped and then retracts flaps from 50% to 0% once a positive rate of climb is established with airspeed at or above that recommended,
- Returns to the previous altitude, heading, and airspeed specified by the instructor.

Common Errors

- Fails to add sufficient rudder input during stall recovery,
- Retracts flaps prematurely during recovery, resulting in excessive loss of altitude,
- Fails to promptly apply full power resulting in an excessive loss of altitude and/or delayed recovery,
- Increases pitch excessively, resulting in a secondary or unintentional stall.

Power-On Stalls

Practice this maneuver with 0% and/or 50% flaps, straight and turning. Enter the maneuver from level flight by reducing power and adding flaps as desired at V_{FE}. Slow the aircraft to V_R while maintaining altitude. At V_R smoothly apply a minimum of 65% power and pitch the aircraft at an angle to induce a stall. Apply rudder to maintain coordination. Recover from this maneuver at the incipient phase or full stall.

Limitations

- Minimum recovery altitude: 1,500 feet AGL,
- Limited to VMC,
- Limit nose high attitude to 30 degrees as per Private and Commercial Practical Test Standards,
- Minimum percent power is 65%

Execution

- Execute clearing turns,
- Flaps 0% or 50% as desired,
- Airspeed- slow to $V_{R,}$
  - SR20 - 20% Power / 15" MP (approximately),
  - SR22 - 15% Power / 12" MP (approximately),
  - SR22TN - 25% Power / 12" MP (approximately),
  - SR22T - 30% Power / 12.5” MP (approximately).
- Bank angle as desired (20 degrees maximum),
- Apply a minimum of 65% power,
- Increase pitch angle to induce stall (maximum 30-degrees pitch attitude).

Recovery

- Reduce angle of attack and level wings,
- Verify full power,
- Accelerate to V_Y,
- Flaps 0%,

- Airspeed 80 KIAS (SR22) 85 KIAS (SR20),
- Clear of terrain and obstacles,
- Positive rate of climb.

Instructor Notes

Power-on stalls simulate a stalled condition during initial climb, enroute climb, or climb-out from a go-around or missed approach. Practice power-on stalls in 50% and 0% flaps conditions. It is recommended to complete 0% flap power-on stalls at a reduced power setting to keep pitch attitudes below 30-degrees nose high.

Proper rudder inputs and coordination is crucial during operations at high angles of attack and high power settings. Ensure pilots apply proper rudder inputs throughout the maneuver.

Completion Standards

- Exhibits knowledge of the elements related to this maneuver and complies with limitations, execution and recovery procedures described in this manual,
- (Private) Maintains a specified heading within +/-10 degrees in straight flight, and a specified angle of bank (less than 20 degrees) within +/-10 degrees,
- (Commercial) Maintains a specified heading within +/-5 degrees in straight flight, and a specified angle of bank (less than 20 degrees) within +/-10 degrees,
- Recognizes and recovers promptly after the stall occurs by simultaneously reducing the angle of attack, increasing power as appropriate, and leveling the wings to return to a straight-and-level flight attitude with a minimum loss of altitude,
- Retracts flaps from 50% to 0% when the aircraft has resumed a climb at or above the recommended flap retraction airspeed.

Common Errors

- Fails to apply proper rudder inputs to maintain coordination during maneuver,
- Reduces pitch attitude too much during recovery, causing an excessive loss of altitude,

- Fails to maintain heading within standards through proper rudder and aileron inputs during maneuver, setup, and recovery.
- Exhibits a lack of knowledge of elements related to spins prevention and spin recovery.

Autopilot Stall Recognition

The purpose of this maneuver is to identify the conditions when a stall with the autopilot engaged may occur, to recognize the effects of an impending autopilot stall, and to learn the recovery procedure. Do not exceed any autopilot limitations during this maneuver. The maneuver is started by programming the autopilot for conditions it is not capable of maintaining (excessive climb rate, insufficient power, etc). Autopilots with Perspective software load 764.09 or later have low-speed protection and respond differently then previous software loads. While software loads 764.08 and prior disconnect the autopilot below 80 KIAS, later loads will remain engaged and will switch mode priorities to maintain a flying airspeed above the stall speed.

Regardless of the software load, the highest priority is to regain aircraft control by decreasing the angle of attack and increasing airspeed. Reference the correct section below for maneuver setup and execution depending on the Perspective software load.

Limitations

- Minimum recovery altitude: 1,500 feet AGL,
- Limited to VMC,
- All autopilot limitations in the AFM apply.

Execution

- Execute clearing turns,
- Flaps as desired,
- Autopilot lateral and pitch modes as desired,
- Throttle insufficient for sustained flight.

Recovery for Software Load 764.09 or later

- Smoothly apply full throttle, and
- Verify and maintain aircraft coordination,
- Reduce throttle as necessary once normal flight is resumed.

Recovery for Software Load 764.08 or prior

- Disconnect autopilot and simultaneously:
  - Reduce angle of attack,
  - Increase throttle as required,

- Level wings,
- After initial recovery, return aircraft to previously assigned heading, altitude, or desired flight condition.

Instructor Notes

Verify Perspective software loads before attempting the autopilot stall recognition maneuver and follow the applicable guidance.

Pilots may get into a slow flight or stalled condition with the autopilot engaged for many reasons. Pilot complacency, inattentiveness, and power mis-management are major reason why pilots may end up ‘behind the power curve’ with the autopilot engaged. It is common to see this situation during periods of high workload, such as on a non-precision approach with multiple step-downs or climbing through turbulent clouds shortly after takeoff during an IFR departure.

Regardless of pilot workload, pilots must always maintain aircraft control through proper instrument scan and interpretation. Scan intervals may be reduced with the autopilot engaged, allowing more time for task completion, but the scan should never be abandoned completely. Pilots must be taught to focus attention on aircraft control when overwhelmed with workload and/or stress.

It is possible to enter the autopilot stall recognition maneuver a few different ways. Draw correlation to specific phases of flight where an autopilot stall is likely. Here are a few maneuver setup examples:

- Simulate a level-off on an approach by entering a descent at 120 KIAS at a constant rate to a desired altitude. Intentionally neglect to restore power to maintain airspeed upon level-off,
- Program an excessive rate of climb with an insufficient power setting. This provides a good example of why climbing in IAS mode is recommended,
- Software loads 764.09 or later: press the go-around button and leave power at or near idle.

Completion Standards

- Describes situations likely to lead to an autopilot stall or under-speed condition,
- Exhibits knowledge of the elements related to autopilot stalls and complies with limitations, execution and recovery procedures described in this manual,

- Recognizes and promptly corrects from an impending autopilot stall or slow flight condition,
- Minimizes loss of altitude by applying proper power inputs and controls aircraft pitch as necessary,
- Returns to previously assigned or desired flight parameters and advises ATC of any inability to maintain an ATC clearance.

Common Errors

- Lacks knowledge of autopilot limitations,
- Becomes complacent and neglects to actively scan and monitor flight status during autopilot operations,
- Fails to verify active and armed autopilot modes,
- Fails to manage power required to maintain the desired airspeed and/or altitude.

Ground Reference Maneuvers

Ground reference maneuvers described in this section are required by Private Pilot and Commercial Practical Test Standards. Practicing these maneuvers helps pilots develop fundamental skills of aircraft control, division of attention, and correction for wind drift. The skills developed while performing these maneuvers have real-life applicability and are the basis for many flight operations performed during normal day-to-day flight operations. Rated pilots should practice these maneuvers to hone skills during recurrent training events and flight reviews.

Complete ground reference maneuvers in an area with an available emergency landing spot. Do not practice ground reference maneuvers in a noise sensitive area. Be sure to avoid areas with towers or congested traffic.

The decision to deploy CAPS must be made immediately below 2,000 feet AGL. Pre-brief if CAPS will be a viable option to increase survival potential if a catastrophic engine failure is experienced during ground reference maneuvers.

It may be beneficial to inhibit TAWS during ground reference maneuvers to reduce cockpit distractions. Ensure the area is free of obstacle or terrain hazards before inhibiting TAWS. Remember to un-inhibit TAWS at the maneuver completion.

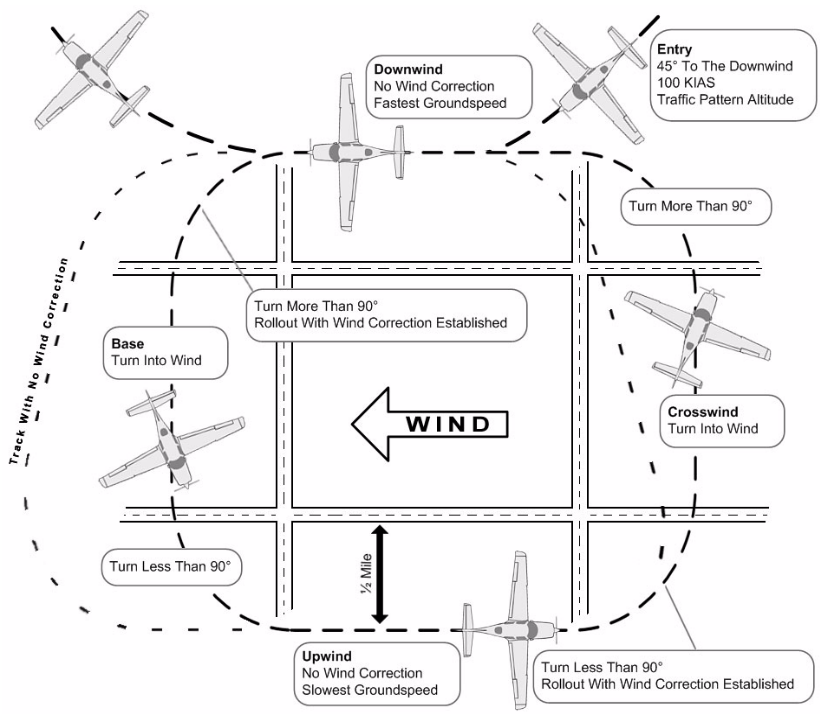
Limitations

- Limited to VMC,
- Minimum altitude 600 feet AGL,
- Within all other regulatory altitude restrictions,
- Within a position to make an emergency landing.

Rectangular Course (Private)

Select a rectangular area approximately one mile in length by a minimum of 1/2 mile wide. Enter the maneuver 45 degrees to the downwind at 1,000 feet AGL. Fly a ground track which is equidistant from all sides of the rectangular area while accounting for wind drift and maintaining constant airspeed and altitude.

Practice this maneuver using an actual runway traffic pattern at an uncontrolled airport with no traffic conflicts when developing basic traffic pattern skills and wind drift correction skills.



Rectangular Course

Execution

- Execute clearing turns,
- Airspeed 100 KIAS,
  - SR20 - 50% Power / 20" MP (approximately),
  - SR22 - 30% Power / 15" MP (approximately),

  - SR22TN - 50% Power / 15" MP (approximately),
  - SR22T - 40% Power / 15” MP (approximately).
- Enter on the downwind leg at a 45-degree angle,
- Maintain approximately 1/2 mile from the reference line.

Recovery

- Add power as necessary and climb to a desired altitude.

Instructor Notes

Conduct the maneuver as low as 600 feet AGL if the pilot is unable to recognize and control wind drift. Maintain defensive positions on the flight, throttle, and rudder controls and take over aircraft control to avoid excessive descent rates due to over-banking or possible bird strike situations. This maneuver is not required during Cirrus courses but may be conducted at the discretion of the pilot or instructor if the pilot lacks basic traffic pattern and wind-drift correction skills.

Completion Standards

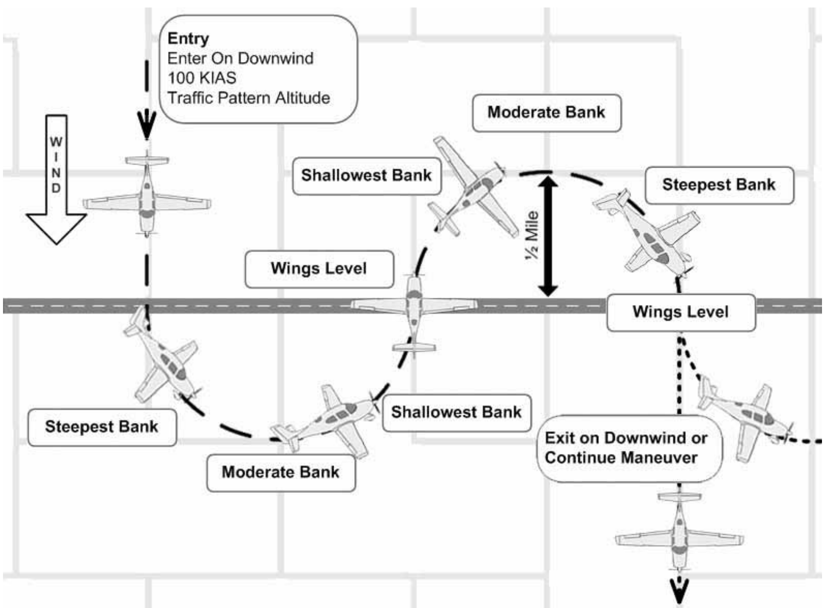
- Selects a suitable area to perform the maneuver considering emergency landing availability, noise abatement, and obstacle and terrain clearance,
- Applies adequate wind-drift correction during straight-and-turning flight to maintain a constant ground track around the rectangular reference area,
- Divides attention between aircraft control and ground track while maintaining coordinated flight,
- Maintains altitude, +/-100 feet, airspeed +/-10 KIAS.

Common Errors

- Fails to apply proper rudder inputs to maintain coordinated flight during the maneuver,
- Fails to clear the area for traffic, terrain, or obstacle hazards,
- Over controls pitch and roll excessively and exceeds performance standards,
- Fails to plan and anticipate wind correction for future segments,
- Displays an inability to quickly scan airspeed and altitude instrumentation.

S-Turns (Private)

Select a road or other prominent straight line on the ground that lies perpendicular to the wind. Enter the maneuver on downwind at 1,000 feet AGL. Complete a series of 180-degree turns of uniform radius in opposite directions, recrossing the reference line at a 90-degree angle just as each 180-degree turn is completed. Apply the necessary wind correction to maintain a constant radius turn on each side of the reference line while maintaining constant airspeed and altitude. Limit bank angles to 45 degrees during the maneuver.



S-Turns

Execution

- Execute clearing turns,
- Airspeed 100 KIAS,
  - SR20 - 50% Power / 20" MP (approximately),
  - SR22 - 30% Power / 15" MP (approximately),
  - SR22TN - 50% Power / 15" MP (approximately),
  - SR22T - 40% Power / 15” MP (approximately).
- Enter the maneuver with the direction of the wind,

- Maintain approximately 1/2 mile radius from the reference line.

Recovery

- Add power as necessary and climb to a desired altitude.

Instructor Notes

Steep bank angles, up to 45 degrees, will be required to maintain the desired flight path over the ground while performing S-turns on windy days. Closely guard the flight controls and ensure the pilot does not enter into an excessive descent rate when banking steeply during this maneuver. Pilots that have difficulty making smooth and level pitch control changes may be improperly scanning instruments or outside references. Ensure pilots are quickly scanning airspeed and altitude instruments as necessary. However, the majority of time should be spent focusing vision forward and towards the next direction of turn. Focusing forward will allow the pilot to see the nose rising or falling and will give the pilot better pitch and altitude control. It is also helpful to practice this maneuver after the pilot has mastered steep turns.

Have the pilot verbalize his or her wind drift control strategies for up-and-coming turns. Doing this forces the pilot to think and plan ahead of the aircraft for future turns.

Pilots are typically caught off guard by the differences in bank angles required between the upwind and downwind segments. This usually results in the pilot banking excessively on the upwind segment and flying inside of the desired track. The aircraft will cross the reference line prematurely and the pilot may attempt to over-bank to correct on the downwind leg. Pilots that get too far ‘behind’ the maneuver should exit and restart.

Completion Standards

- Selects a suitable ground reference line perpendicular to the wind,
- Applies adequate wind-drift correction to track a constant radius turn on each side of the selected reference line,
- Reverses the direction of turn directly over the selected reference line,
- Divides attention between airplane control and ground track while maintaining coordinated flight,
- Maintains altitude, +/-100 feet, airspeed +/-10 KIAS,

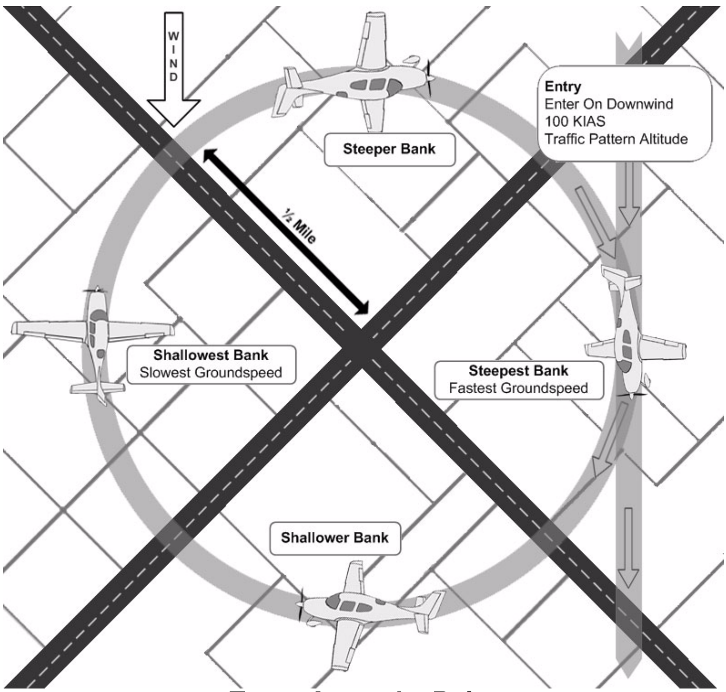
- Remains clear of all obstacles or terrain.

Common Errors

- Fails to apply proper rudder inputs to maintain coordinated flight,
- Fails to clear area for traffic, terrain, or obstacle hazards,
- Over-controls pitch and roll excessively,
- Fails to plan and anticipate wind correction for future segments,
- Displays an inability to quickly scan airspeed and altitude instrumentation,
- Over-banks the aircraft and allows an excessive descent rate or sacrifices airspeed causing an accelerated stall condition.

Turns Around a Point (Private)

Find an area which will allow for safe execution of this maneuver and an available emergency landing area. Select a suitable, prominent ground reference point. Enter the maneuver on downwind at 1,000 feet AGL. Fly two or more complete, uniform-radius circles around the reference point while compensating for wind drift and maintaining constant airspeed and altitude. Limit bank angles to 45 degrees.



Turns Around a Point

Execution

- Execute clearing turns,
- Airspeed 100 KIAS,
  - SR20 - 50% Power / 20" MP (approximately),
  - SR22 - 30% Power / 15" MP (approximately),
  - SR22TN - 50% Power / 15" MP (approximately),
  - SR22T - 40% Power / 15” MP (approximately).
- Enter with the wind and start a left or right turn,

- Maintain approximately 1/2 mile radius from reference point.

Recovery

- Add power as required and climb to desired altitude.

Instructor Notes

Mastering turns around a point before attempting steep spirals or emergency descents to landing is beneficial. Excessive bank angles without sufficient elevator back pressure leads to excessive descent rates. Closely guard flight controls to ensure pilots do not enter excessive descent rates too close to the ground.

Completion Standards

- Selects a suitable ground reference point,
- Plans the maneuver so as to enter a left or a right turn at 1,000 feet AGL, at an appropriate distance from the reference point,
- Applies adequate wind-drift correction to track a constant radius turn around the selected reference point,
- Divides attention between airplane control and ground track while maintaining coordinated flight,
- Maintains altitude +/-100 feet, airspeed +/-10 KIAS.

Common Errors

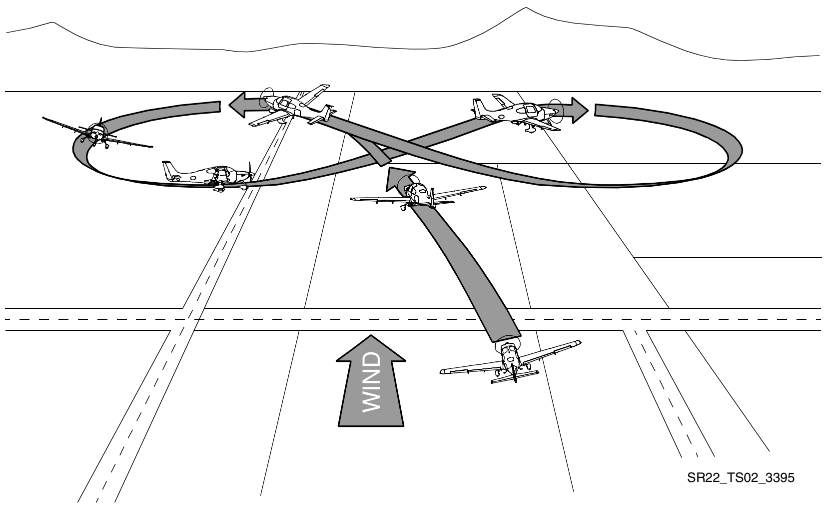
- Fails to apply proper rudder inputs to maintain coordination,
- Fails to anticipate wind conditions for future segments,
- Banks excessively on the upwind segment of the maneuver,
- Fails to adjust pitch control while changing angles of bank,
- Focuses excessively inside the aircraft,
- Fails to scan for traffic during maneuver.

Eight On Pylons (Commercial)

Eights on pylons is the most advanced and most difficult of ground reference maneuvers. Because of the various techniques involved, eights on pylons is unsurpassed for teaching, developing, and testing subconscious control of the airplane.

This training maneuver involves flying the airplane in circular paths, alternately left and right, in the form of a figure “eight” around two selected points or pylons on the ground. Unlike eights around pylons, however, no attempt is made to maintain a uniform lateral distance from the pylon. In eights on pylons, the distance from the pylons varies if there is any wind. Instead, the airplane is flown at such a precise altitude and airspeed that a line parallel to the airplane’s lateral axis, and extending from the pilot’s eye, appears to pivot on each of the pylons.

Also, unlike eights around pylons, in the performance of eights on pylons the degree of bank increases as the distance from the pylon decreases. The altitude that is appropriate for the airplane being flown is called the pivotal altitude and is governed by the groundspeed. While not truly a ground track maneuver as were the preceding maneuvers, the objective is similar: to develop the ability to maneuver the airplane accurately while dividing one’s attention between the flight path and the selected points on the ground. In explaining the performance of eights on pylons, the term “wing tip” is frequently considered as being synonymous with the proper reference line, or pivot point on the airplane. The selected pylons should also be at the same elevation, since differences of over a very few feet will necessitate climbing or descending between each turn.



Eight On Pylons

Execution

- Calculate approximate pivotal altitude (TAS squared and divided by 11.3),
- Define visible ground reference points separated by approximately 3/4 NM and perpendicular to the wind,
- Establish level flight at calculated pivotal altitude at 120 KIAS,
  - SR20 - 60% Power / 21" MP (approximately),
  - SR22 - 30% Power / 18" MP (approximately),
  - SR22TN - 55% Power / 20" MP (approximately),
  - SR22T - 50% Power / 18” MP (approximately).
- Cross diagonally between points with the wind so that the first turn is made into the wind,
- Adjust angle of bank as required to maintain a sight line with the reference point(s),
- Adjust pitch as required to maintain pivotal altitude, which changes with ground speed,
- Apply rudder as required to maintain coordination,

- Complete the desired number of figure “eight” circuits around the reference points.

Recovery

- Add power as required and climb to desired altitude.

Instructor Notes

As the eight on pylon is an advanced maneuver in which the pilot’s attention is directed at maintaining a pivotal position on a selected pylon, with a minimum of attention within the cockpit, it should not be introduced until the instructor is assured that the student has a complete grasp of the fundamentals. The prerequisites are: the ability to make a coordinated turn without gain or loss of altitude, excellent feel of the airplane, stall recognition, relaxation with low altitude maneuvering, and an absence of the error of over-concentration.

Completion Standards

- Describes elements related to pivotal altitude,
- Determines the approximate pivotal altitude,
- Enters the maneuver at the appropriate altitude and airspeed and at a bank angle of approximately 30 to 40 degrees at the steepest point,
- Divides attention between accurate coordinated airplane control and outside visual references,
- Holds pylon using appropriate pivotal altitude avoiding slips and skids.

Common Errors

- Exhibits inadequate knowledge relating to pivotal altitude, and/or ability to visualize maneuver,
- Makes a poor choice of ground reference points,
- Fails to consider surface winds, obstacles, emergency landing areas and/or traffic when defining ground reference points,
- Enters above or below calculated pivotal altitude,
- Uses rudder inputs to position the reference point on the pylon.

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Section 6
Performance

General

To determine what performance to expect from the airplane under various ambient and field conditions, Refer to Section 5 - Performance, of the Pilot’s Operating Handbook. Performance data are presented for takeoff, climb, and cruise (including range & endurance).

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Section 7
Limitations

General

The Limitations Section of the Pilot's Operating Handbook (POH) is the official document approved by the Federal Aviation Administration. It provides operating limitations, instrument markings, basic placards required by regulation, and standard systems and equipment required for safe operation. For amended operating limitations for airplanes equipped with optional equipment, refer to Section 9 - Supplements of the Pilot's Operating Handbook.

Compliance with the operating limitations in Pilot's Operating Handbook is required by Federal Aviation Regulations.

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