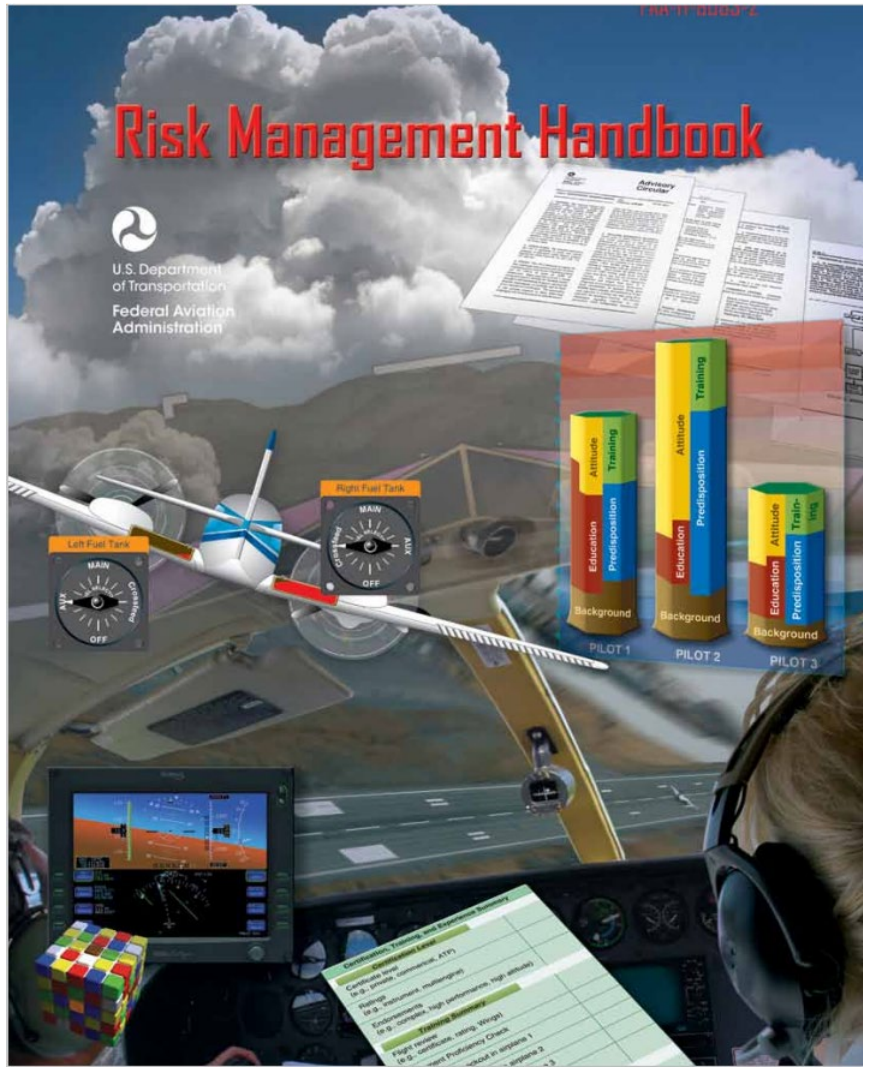
Risk Management

In General Aviation

FAA Risk Management Handbook

- faa-h-8083-2.pdf



Background

- Degree of risk in everything we do
- General Aviation Accidents decreased slightly in 2020 from 1,167 accidents in 2019 to 1,051 accidents (from 4.87 accidents per 100,000 flight hours to 4.69 accidents per 100,000 flight hrs)
- GA Fatal accidents also decreased
- Managing risk is a key to flying safely and further reducing the number of accidents

Risk Management: Definition

- The part of the decision making process that relies on situational awareness, problem recognition and good judgement to reduce risks associated with each flight. Pilot's Handbook of Aeronautical Knowledge
- A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures. ICAO 2013

- Risk is a variable, constantly changing and coming from many internal and external sources. Pilots may find that certain risks are unacceptable, while others are acceptable.

Risk Management

- Three essential components

1. Hazard Identification: The identification of an unfavorable event that has the potential to lead to occurrence of a hazard which has the potential to cause harm.
2. Risk Assessment: Hazards are ranked by the seriousness of their negative effect and ranked in order of their risk-bearing potential.
3. Risk Mitigation: If the risk is determined to be unacceptable, then measures must be taken to reinforce and increase the level of defenses against that risk, or to entirely avoid or remove the risk.

- Navy ORM includes:
    4. Implement Controls
    5. Supervise

The Swiss Cheese Model

Professor Dr. James Reason

- Slices represent the various levels of system defenses (Training, Maintenance, automation, etc.).
- The holes represent single-point failures which alone may be inconsequential. However, a series of “holes” could align and lead to an accident or incident.
- No matter how much precaution or planning has been performed, error is inevitable when humans are involved. Therefore it is crucial to identify, report and analyze errors as well as develop strategies to control and eliminate errors.

Aeronautical Decision Making

- ADM refers to the mental process used by humans to determine a best course of action in a given set of circumstances. The FAA has a three-part approach to ADM:
  - Perceive the given set of circumstances
  - Process by evaluating their impact on flight safety
  - Perform by implementing the best course of action
- The Human brain must filter incoming information and retain only certain parts of that information that it deems important.
  - When the brain becomes overloaded, incoming information is compensated by filling in the gaps which typically involves the storage and usage of inaccurate information.
- The brain also tends to rely on previous patterns and expectations which may sometimes be beneficial, although it can also be potentially dangerous and cause one to overlook a critical step or action

Confirmation Bias and Get-There-itis

- A tendency to seek out information to support a decision already made
- When evaluating options for a decision, how alternatives are framed may also influence the decision
- Example:

  "By continuing through inclement weather I will arrive as scheduled and not have to divert"
- When preparing for flight, many considerations must be made to ensure safety.
  - Even an inconsequential factor has the potential to cause harm and affect the overall safety of a flight.
  - Something as small as a lack of sleep, the ingestion of an over-the-counter medication, or domestic stressors may negatively affect a pilot's ability to safety operate an aircraft.
  - Understanding our own human limitations, as well as the limitations of the aircraft and its systems can aid in the creation of a personal and/or organizational safety culture, as well as aid in the mitigation of risk and hazards.

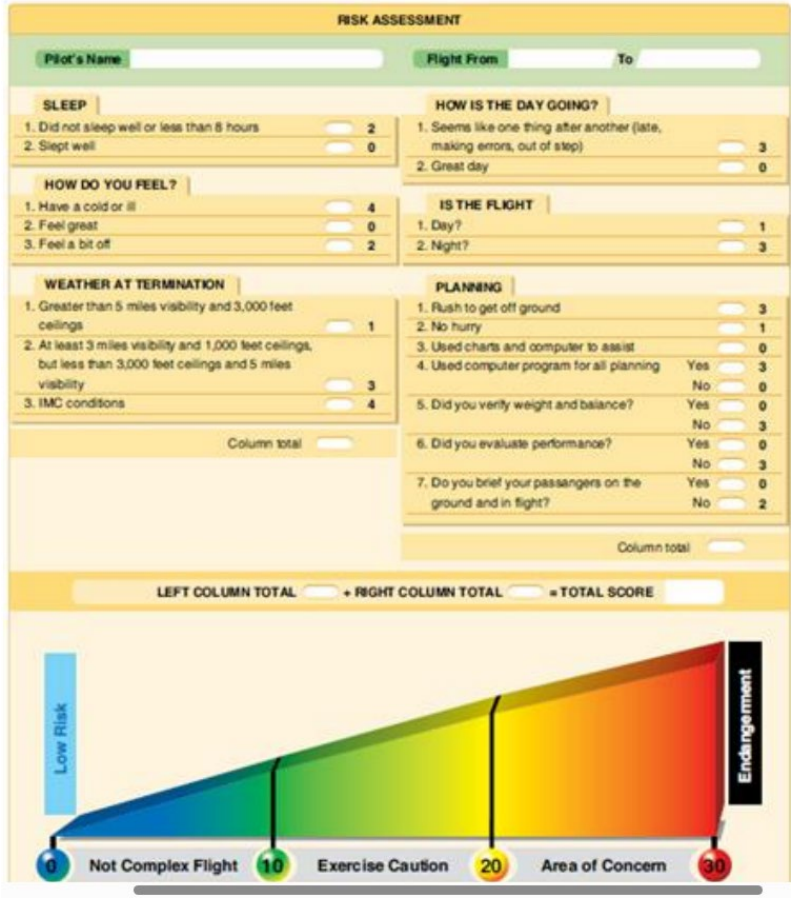
Flight Risk Assessment Tools

- “In the thick” is no time to try to mitigate a potentially hazardous outcome
  - Before the flight, take time to identify and assess potential hazards and mitigations
- Attempting this task “in our heads” usually does not take into account actual risk exposure.
  - The mind tends to compartmentalize the individual hazards which, in turn, fails to appreciate their cumulative effects.
  - We may also allow our personal desires to manipulate our risk assessment in order to meet personal goals
- Putting everything on “paper”
  - Allows us to establish our risk limits in an atmosphere free from the pressure of an impending flight or maintenance task.
  - Gives a perspective on the entire risk picture that we cannot get in our heads.
  - Sets the stage for managing risk through proactive risk mitigation strategies that are documented.

Flight Risk Assessment Tools

- Flight Risk Assessment Tool (faa.gov)
  - Resources - Library - FAA - FAASTeam - FAASafety.gov
- Because every flight has some level of risk, it is critical that pilots are able to differentiate, in advance, between a low risk flight and a high risk flight, and establish a review process and develop risk mitigation strategies.
- A FRAT enables proactive hazard identification, is easy to use, and can visually depict risk. It is an invaluable tool in helping pilots make better go/no-go decisions and should be a part of every flight.

Link in article to tool does not work!



Flight Risk Assessment Tools

- Typically, a FRAT will look at the following areas: PAVE
  - Pilot
  - Aircraft
  - enVironment
  - External pressures

- Based on the answers you supply, a total risk score is calculated.
  - Green: Go Fly
    - However, this does not mean there is no risk
    - Be aware of hazards and mitigate what you can
    - A low score is still possible even with a high risk item
  - Yellow: Try to mitigate some of the higher scoring items
    - E.g., waiting for weather to pass
    - [PRNFC] Reach out to FCA
  - Red: No-Go.
    - Consider cancelling the flight unless risks can be safely mitigated
    - Do not allow external pressures to force an unsafe situation

Risk to using Numerical FRAT

- The most critical flaw revolves around the go/no-go numerical or other threshold
  - A near perfect low score indicates it's all right to launch or continue, but there might just be one item with a negative score
  - That one risk could have a high probability of occurrence with catastrophic consequences, and thus be a very high risk, if not effectively mitigated
- By their nature, FRATs consisting of a list of specific items and may not include all potential risks for a planned or ongoing flight
  - It's almost impossible to list all potential flight hazards, since each flight is unique
  - Unless you have risk categories that are all-inclusive, you may miss some that could critically affect your flight
- Further, any numerical-based FRAT could tempt the pilot to fudge the score by downgrading a risk to bring the final score to an acceptable level

An Effective FRAT

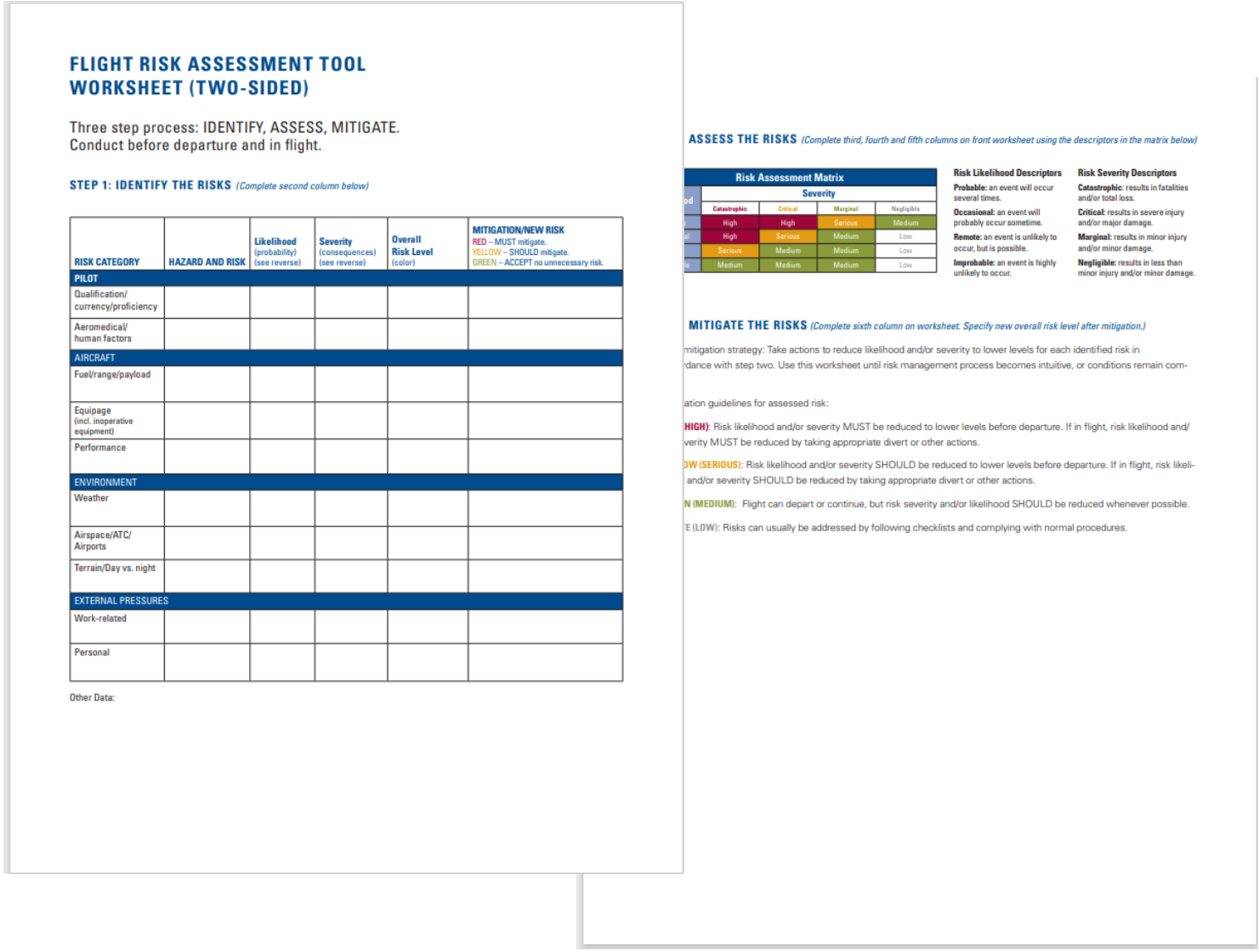
- Identified hazards and go/no-go should not be based on a numerical score
  - Rather, the hazards identified should result from a comprehensive analysis of all potential threat areas and how they will specifically affect the planned or ongoing flight
- Should not have a finite list of standard hazards
  - Rather, it should be based on a broad analysis of all potential threat categories
- Should allow the pilot to specify mitigating actions that will reduce its likelihood and/ or severity
- Should not permit false positives or negatives
  - It should clearly and accurately show the actual hazards and risks, their likelihood and severity, and how the mitigation actions will lower them
- Should prevent pilots from becoming lazy about risk by merely checking off boxes and depending on a single number to make a go/no-go decision
  - Rather, it should lead a pilot through an intuitive process that accurately identifies, assesses, and mitigates risk

- Single-Pilot Risk Management Guide | NBAA - National Business Aviation Association

An Analytic FRAT

- Developed by the National Business Aviation Association

- Risk Management Guide for Single-Pilot Light Business Aircraft (nbaa.org)
- Flight Risk Assessment Tool Worksheet



FLIGHT RISK ASSESSMENT TOOL WORKSHEET (TWO-SIDED)

Three step process: IDENTIFY, ASSESS, MITIGATE.
Conduct before departure and in flight.

STEP 1: IDENTIFY THE RISKS *(Complete second column below)*

RISK CATEGORY	HAZARD AND RISK	Likelihood (probability) (see reverse)	Severity (consequences) (see reverse)	Overall Risk Level (color)	MITIGATION/NEW RISK RED – MUST mitigate. YELLOW – SHOULD mitigate. GREEN – ACCEPT no unnecessary risk.
PILOT					
Qualification/ currency/proficiency					
Aeromedical/ human factors					
AIRCRAFT					
Fuel/range/payload					
Equipage (incl. inoperative equipment)					
Performance					
ENVIRONMENT					
Weather					
Airspace/ATC/ Airports					
Terrain/Day vs. night					
EXTERNAL PRESSURES					
Work-related					
Personal					

Other Data:

ASSESS THE RISKS *(Complete third, fourth and fifth columns on front worksheet using the descriptors in the matrix below)*

Risk Assessment Matrix

	Severity			
	Catastrophic	Critical	Marginal	Negligible
	High	High	Serious	Medium
	High	Serious	Medium	Low
	Serious	Medium	Medium	Low
	Medium	Medium	Medium	Low

Risk Likelihood Descriptors

Probable: an event will occur several times.

Occasional: an event will probably occur sometime.

Remote: an event is unlikely to occur, but is possible.

Improbable: an event is highly unlikely to occur.

Risk Severity Descriptors

Catastrophic: results in fatalities and/or total loss.

Critical: results in severe injury and/or major damage.

Marginal: results in minor injury and/or minor damage.

Negligible: results in less than minor injury and/or minor damage.

MITIGATE THE RISKS *(Complete sixth column on worksheet. Specify new overall risk level after mitigation.)*

mitigation strategy: Take actions to reduce likelihood and/or severity to lower levels for each identified risk in dance with step two. Use this worksheet until risk management process becomes intuitive, or conditions remain com-

ation guidelines for assessed risk:

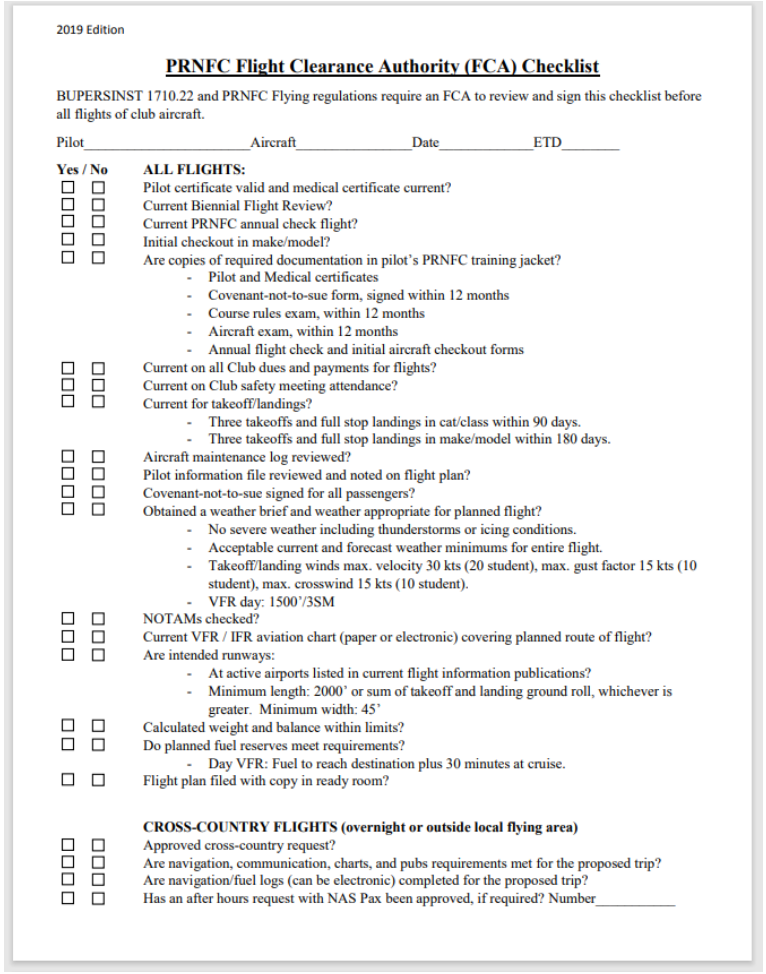
HIGH): Risk likelihood and/or severity MUST be reduced to lower levels before departure. If in flight, risk likelihood and/ verity MUST be reduced by taking appropriate divert or other actions.

W (SERIOUS): Risk likelihood and/or severity SHOULD be reduced to lower levels before departure. If in flight, risk likeli- and/or severity SHOULD be reduced by taking appropriate divert or other actions.

N (MEDIUM): Flight can depart or continue, but risk severity and/or likelihood SHOULD be reduced whenever possible.

E (LOW): Risks can usually be addressed by following checklists and complying with normal procedures.

The PRNFC FRAT (the FCA Checklist)



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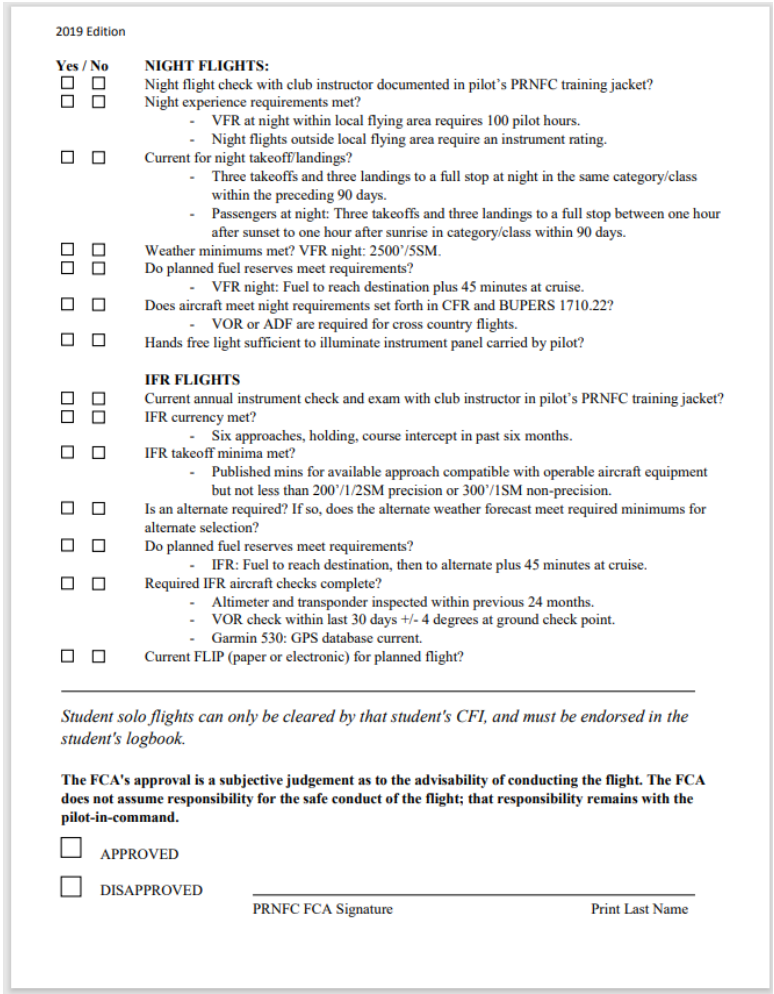
PRNFC Flight Clearance Authority (FCA) Checklist

BUPERSINST 1710.22 and PRNFC Flying regulations require an FCA to review and sign this checklist before all flights of club aircraft.

Pilot_____Aircraft_____Date_____ETD_____

Yes	No	**ALL FLIGHTS:**
☐	☐	Pilot certificate valid and medical certificate current?
☐	☐	Current Biennial Flight Review?
☐	☐	Current PRNFC annual check flight?
☐	☐	Initial checkout in make/model?
☐	☐	Are copies of required documentation in pilot's PRNFC training jacket? - Pilot and Medical certificates - Covenant-not-to-sue form, signed within 12 months - Course rules exam, within 12 months - Aircraft exam, within 12 months - Annual flight check and initial aircraft checkout forms
☐	☐	Current on all Club dues and payments for flights?
☐	☐	Current on Club safety meeting attendance?
☐	☐	Current for takeoff/landings? - Three takeoffs and full stop landings in cat/class within 90 days. - Three takeoffs and full stop landings in make/model within 180 days.
☐	☐	Aircraft maintenance log reviewed?
☐	☐	Pilot information file reviewed and noted on flight plan?
☐	☐	Covenant-not-to-sue signed for all passengers?
☐	☐	Obtained a weather brief and weather appropriate for planned flight? - No severe weather including thunderstorms or icing conditions. - Acceptable current and forecast weather minimums for entire flight. - Takeoff/landing winds max. velocity 30 kts (20 student), max. gust factor 15 kts (10 student), max. crosswind 15 kts (10 student). - VFR day: 1500'/3SM
☐	☐	NOTAMs checked?
☐	☐	Current VFR / IFR aviation chart (paper or electronic) covering planned route of flight?
☐	☐	Are intended runways: - At active airports listed in current flight information publications? - Minimum length: 2000' or sum of takeoff and landing ground roll, whichever is greater. Minimum width: 45'
☐	☐	Calculated weight and balance within limits?
☐	☐	Do planned fuel reserves meet requirements? - Day VFR: Fuel to reach destination plus 30 minutes at cruise.
☐	☐	Flight plan filed with copy in ready room?

		CROSS-COUNTRY FLIGHTS (overnight or outside local flying area)
☐	☐	Approved cross-country request?
☐	☐	Are navigation, communication, charts, and pubs requirements met for the proposed trip?
☐	☐	Are navigation/fuel logs (can be electronic) completed for the proposed trip?
☐	☐	Has an after hours request with NAS Pax been approved, if required? Number_____



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Yes	No	**NIGHT FLIGHTS:**
☐	☐	Night flight check with club instructor documented in pilot's PRNFC training jacket?
☐	☐	Night experience requirements met? - VFR at night within local flying area requires 100 pilot hours. - Night flights outside local flying area require an instrument rating.
☐	☐	Current for night takeoff/landings? - Three takeoffs and three landings to a full stop at night in the same category/class within the preceding 90 days. - Passengers at night: Three takeoffs and three landings to a full stop between one hour after sunset to one hour after sunrise in category/class within 90 days.
☐	☐	Weather minimums met? VFR night: 2500'/5SM.
☐	☐	Do planned fuel reserves meet requirements? - VFR night: Fuel to reach destination plus 45 minutes at cruise.
☐	☐	Does aircraft meet night requirements set forth in CFR and BUPERS 1710.22? - VOR or ADF are required for cross country flights.
☐	☐	Hands free light sufficient to illuminate instrument panel carried by pilot?

		IFR FLIGHTS
☐	☐	Current annual instrument check and exam with club instructor in pilot's PRNFC training jacket?
☐	☐	IFR currency met? - Six approaches, holding, course intercept in past six months.
☐	☐	IFR takeoff minima met? - Published mins for available approach compatible with operable aircraft equipment but not less than 200'/1/2SM precision or 300'/1SM non-precision.
☐	☐	Is an alternate required? If so, does the alternate weather forecast meet required minimums for alternate selection?
☐	☐	Do planned fuel reserves meet requirements? - IFR: Fuel to reach destination, then to alternate plus 45 minutes at cruise.
☐	☐	Required IFR aircraft checks complete? - Altimeter and transponder inspected within previous 24 months. - VOR check within last 30 days +/- 4 degrees at ground check point. - Garmin 530: GPS database current.
☐	☐	Current FLIP (paper or electronic) for planned flight?

Student solo flights can only be cleared by that student's CFI, and must be endorsed in the student's logbook.

The FCA's approval is a subjective judgement as to the advisability of conducting the flight. The FCA does not assume responsibility for the safe conduct of the flight; that responsibility remains with the pilot-in-command.

☐ APPROVED

☐ DISAPPROVED

PRNFC FCA Signature Print Last Name

References

- As Safe As The Airlines? - Aviation Safety (aviationsafetymagazine.com)
- General Aviation Safety (greenspun.com)
- Risk Management in General Aviation (flyhpa.com)
- Risk management - AOPA
- Flight Risk Assessment Tool (faa.gov)
- faa-h-8083-2.pdf
- General Aviation Safety | Federal Aviation Administration (faa.gov)