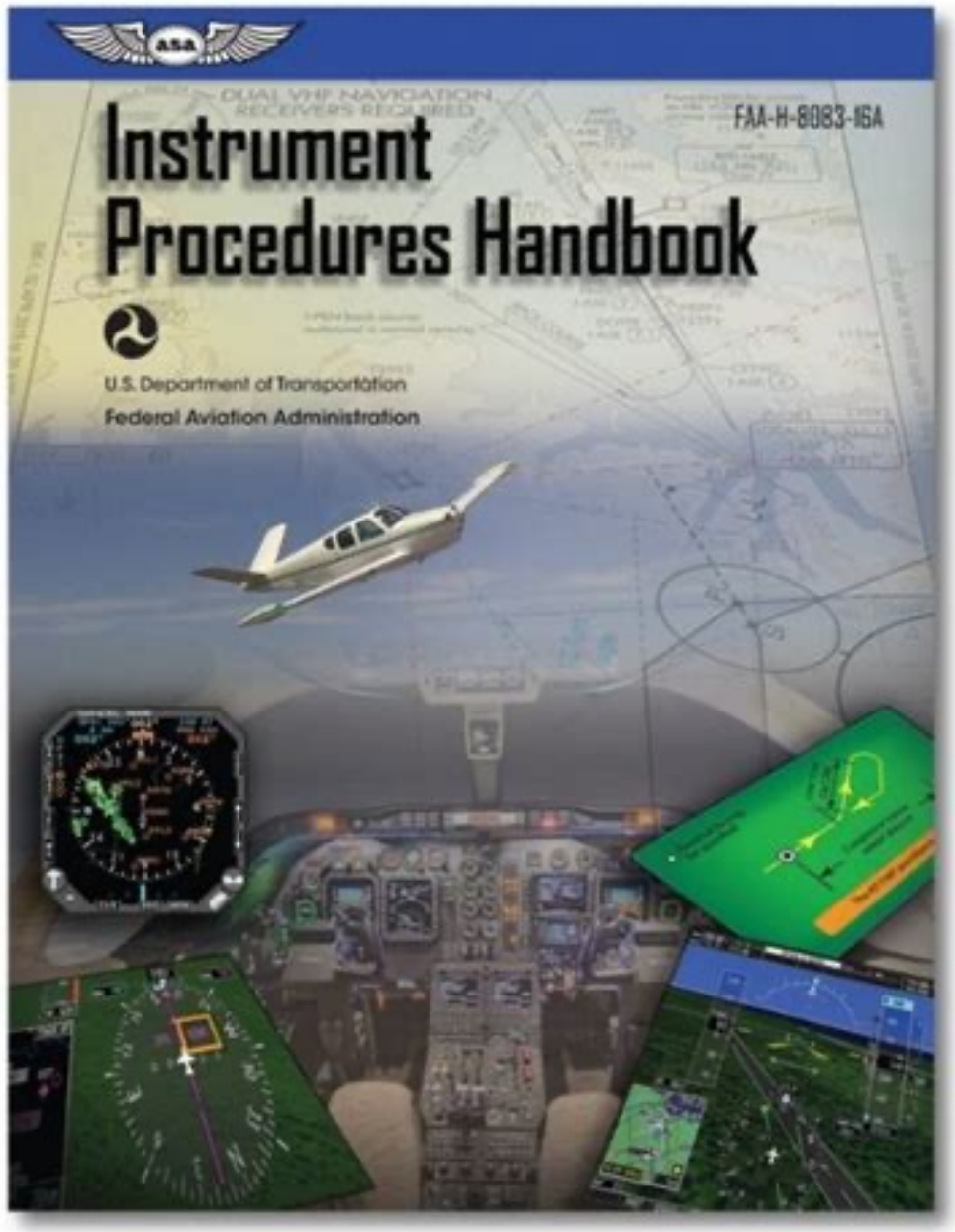
Standard Operating Procedures (SOPs)

John Mahany

ATP/MCFI-AIMEG

CE-500, LR-JET, N-B25, DC-3

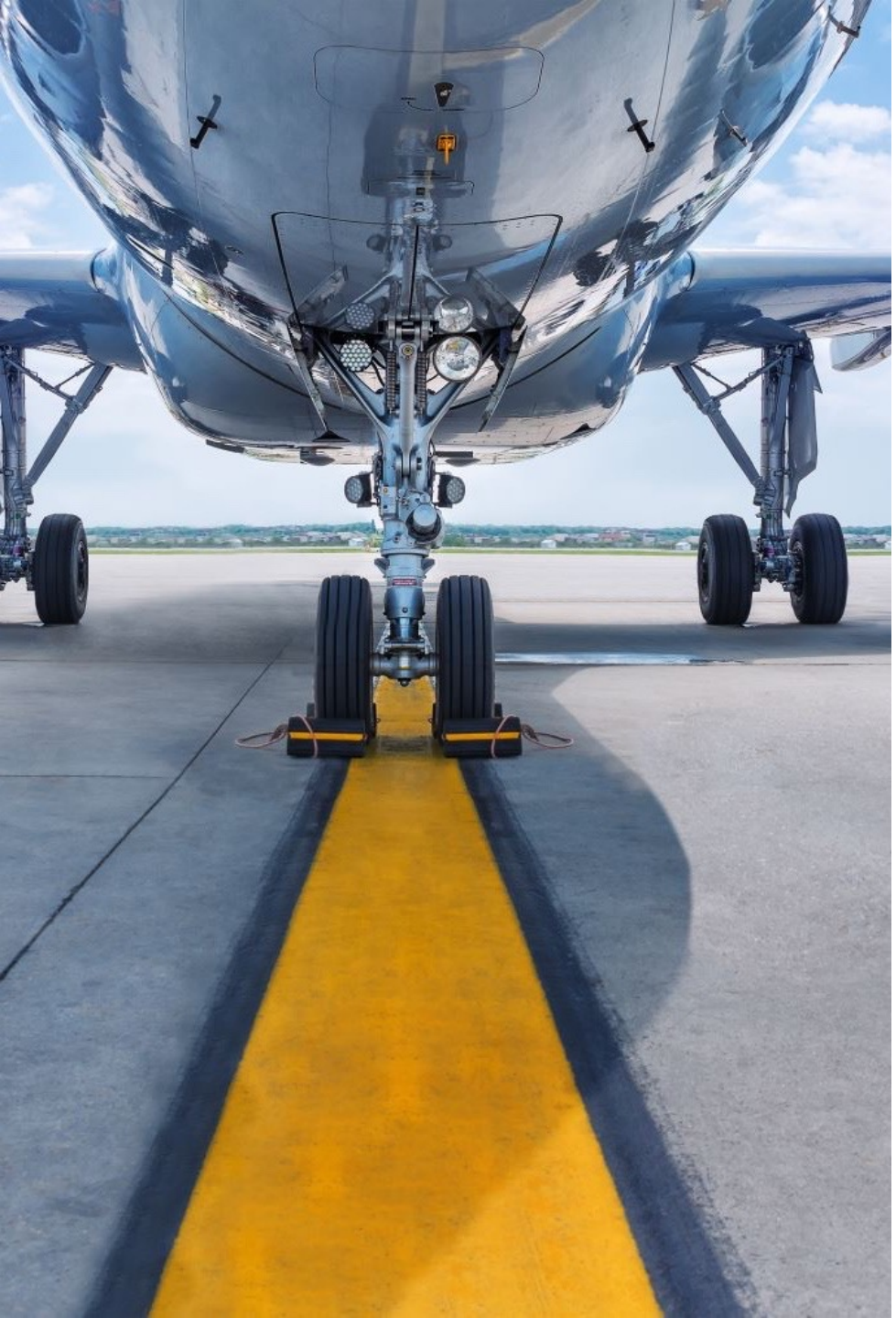


SoCal Pilots, April 12, 2022

- Intro – What are Standard Operating Procedures?
- What's their purpose? (audience participation)

SOPs

Introduction



SOPs

- What's their purpose?
  - They ensure the aircraft is flown according to the manufacturer's guidelines.
  - They promote adherence to the mftr's and airline/military/company's operating philosophy.
    - Promoting operational safety
    - Promoting operational efficiency
    - Utilize aircraft resources and functionality appropriately

SOPs apply regardless of what you fly. I have flown these aircraft and many others

SOPs continued

- In a crew environment, SOPs also allow *any 2* crewmembers who have *not flown together before* **to fly together and function effectively as a crew**.
- Adhering to SOPs means ***each pilot knows exactly what to expect from the other***.

SOPs

- Some users of the National Airspace System live by Standard Operating Procedures (SOPs), and ***some do not***. This is arguably the **most significant difference** between air carriers and general aviation when it comes to training, testing, and “cockpit culture”

SOPs

SOPs vs Personal Minimums

Personal Minimums are *not enough*

SOPs

- SOPs vs. Personal Minimums
  - From the FAA's Safety Briefing, as stated by the General Aviation Joint Steering Committee, Safety Enhancement Topic (GAJSC): Personal Minimums defined thus: Personal Minimums refer to an individual pilot's set of procedures, rules, criteria and guidelines for deciding whether and under what conditions to operate (or continue operating) in the NAS.

SOPs

- Neglecting to use standard procedures, or lacking them entirely, has been the common thread in Part 121 and 135 flight accidents, the NTSB found.

SOPs

- For example, examination of 86 turbine aircraft accidents with 149 fatalities between 2001 and 2010 found a “lack of adequate procedures, policies, or checklists” and a “lack of flight crew adherence to procedures, policies, or checklists” as contributing causes.

SOPs

- FAA AC 120-71B Dated 01/10/17 – Standard Operating Procedures and Pilot Monitoring Duties for Flight Deck Crewmembers
- About Advisory Circulars: They are generally informative in nature. **Advisory Circulars are neither binding nor regulatory**; yet some have the effect of de facto standards or regulations. Advisory circulars typically refer to industry standards.

SOPs – Before Flight

SOPs

- SOP’s range from preflight items before flight including checking the weather, to proper attire/uniform/dress code, what time to show up for a flight, who does what, etc.
- Checklists and more. This includes but is not limited to adherence to any or all applicable FARs and other rules, Aircraft manuals, Company Ops manual, weather minimums, etc.

SOPs -

- Avionics and devices ready? Any updates? Are required charts downloaded?

SOPs

- Single Pilot CRM aka Single-Pilot Resource Management (SRM)
- Per the FAA's PHAK

- SRM defined as 'the art and science of managing all resources…'
  - Including the concepts of ADM, Risk Management (RM), Task Management ™, Automation Management (AM), Controlled Flight into Terrain (CFIT), and Situation Awareness (SA)

  - SRM helps the pilot maintain SA by managing the automation along with aircraft control and navigation tasks, thereby making accurate and timely decisions.

SOPs

- 2 defining elements are hazard and risk. And each pilot may judge a risk or hazard differently, depending on experience level, recency of experience, aircraft performance and capability

SOPs start BEFORE the flight. Check the airplane and the weather

SOPs

- Is the airplane airworthy?
- Any maintenance squawks?
- FAR 91.7 Civil Airworthiness. Is the airplane legal to fly? Annual inspection, applicable AD's, etc.?
- Separately, is the pilot legal and safe to fly? From the PHAK
  - PAVE; PIC, Aircraft, EnVironment, External Pressures
  - IMSAFE; Illness, Medication, Stress, Alcohol, Fatigue, Emotion

SOPs

How do you check weather? Many sources now: online www.1800wxbrief.com and others

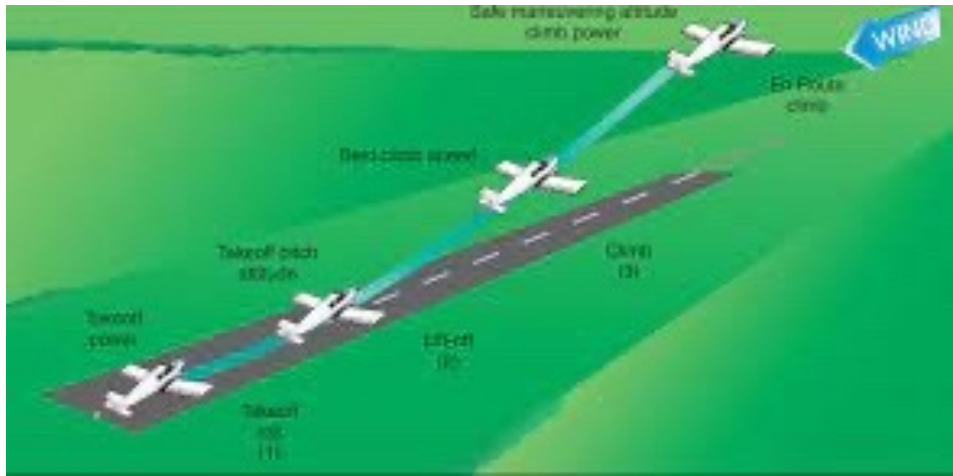
a Device or an app; ForeFlight, WingX

Any go/no-go criteria? Your experience; Personal mins? Published Minimums, or maybe higher? i.e.., 400’/1SM, 600’/2SM?

SOPs

- Preflight. FAR 91.103 Preflight Action.
- Including aircraft performance for takeoff.
  - How much runway is required?
    - How much is available?
  - Any applicable NOTAMS, or runway closures?
  - IFR, is there an ODP? If so, what are the climb requirements?
    - Is the airplane capable? Check the AFM for your aircraft.

Press Alt In Feet	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst
S. L.	545	1290	565	1320	585	1350	605	1380	625	1415
1000	565	1320	585	1350	605	1385	625	1420	650	1450
2000	585	1355	610	1385	630	1420	650	1455	670	1490
3000	610	1385	630	1425	655	1460	675	1495	695	1530
4000	630	1425	655	1460	675	1495	700	1535	725	1570
5000	655	1460	680	1500	705	1535	725	1575	750	1615
6000	680	1500	705	1540	730	1580	755	1620	780	1660



SOPs – airplane specific. Checklists and POH.

SOPs

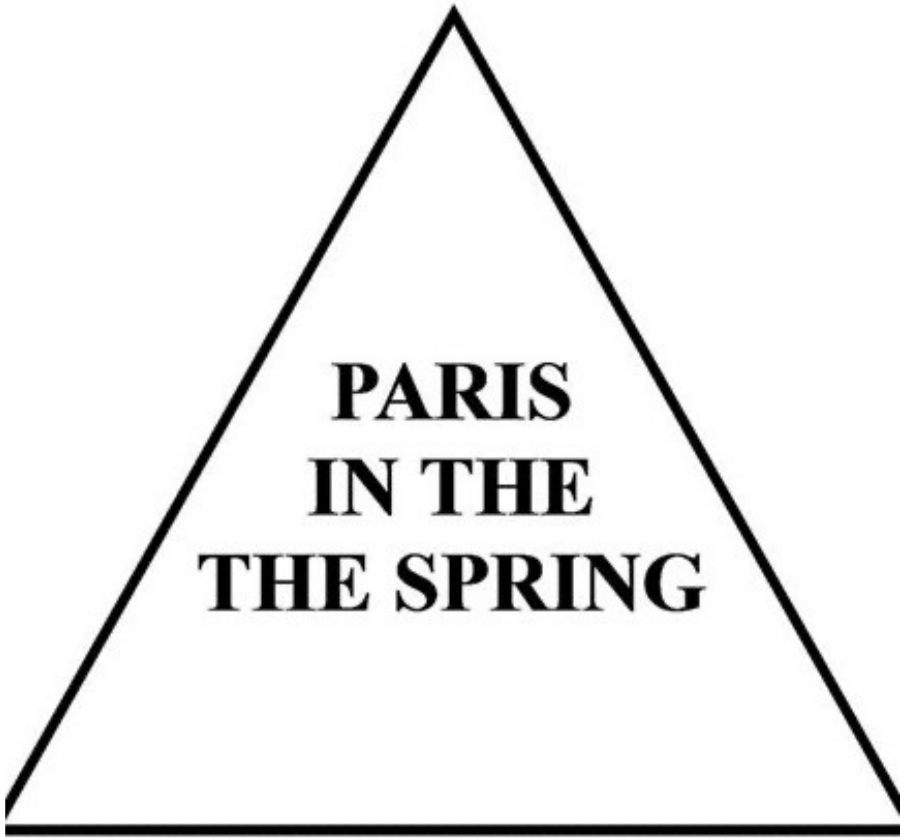
- What about being interrupted during a checklist? Very likely on the ground before start.
- Airline SOPs call for you to start over (seriously) so you don’t miss anything.

SOPs

- Checklists – ‘Do list’ vs checklist. ‘Flow’ or ‘Checklist’?
- Making sure it’s;
  - Done correctly
  - Appropriate action IS taken,
  - Appropriate response given.
    - *Specific action, not ‘as required’*.

SOPs

- ***Don't rush***.
  - what you SEE is what you SEE not what you WANT to see, i.e.; '*expectation bias*'; 3 green gear lights…instead of 2 green?
- FAR 91 pilots – you ***can*** make a change to a checklist if necessary. Not so for 135 or 121.

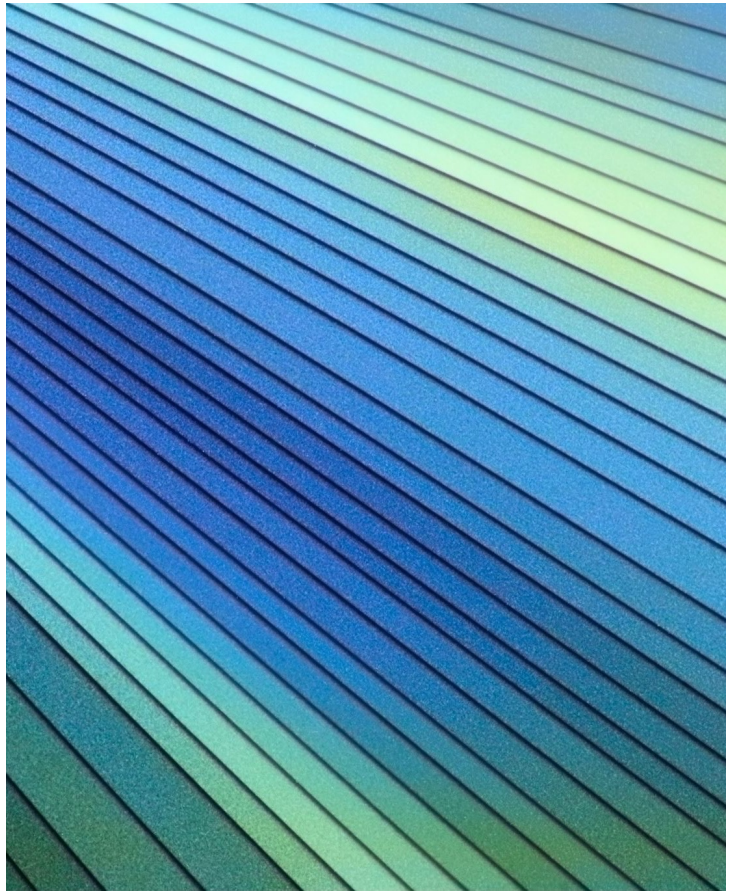


SOPs

ATC IFR Clearance

Copy ATC Clearance BEFORE taxi if possible.

- IF not received before taxi, then ***wait*** until in the runup area.
- Why? Because then you will be *tempted* to start programing your avionics
- WHILE taxiing, a BIG distraction***. BAD thing***! No time for heads down during taxi. You *are not watching where you are going.*



SOPs

How is your cockpit set up?

How are your avionics set up? PFD? MFD? iPad, etc.

Avionics switches/knobs?

What's your flow?

SOPs Taxi

SOPs

Complete	Have	Anticipate
Complete after start and taxi checks ***BEFORE*** taxi.	Have airport taxi diagram out.	**Anticipate** the taxi route to the runway. Know what to expect. Then write it down (shorthand), or draw out if using ForeFlight

SOPs

Minimize distractions during taxi!

NO CHECKLISTS

Sterile cockpit/No unnecessary conversations

Maintain centerline

Taxi/landing lights ON for taxi. Turn OFF when stopped or holding short.

SOPs Before Takeoff

SOPs

- Before takeoff;
  - crew or single-pilot, (self) brief as necessary. Have a plan.
  - Call out/confirm assigned (correct)runway (Ref. Comair Accident, KLEX)
  - What to do if something Fails! HAVE A PLAN! Have to abort? Avoid high speed aborts if possible! Not pretty.
  - What's your takeoff alternate? Are you familiar with this?
    - IF something goes wrong right after takeoff, where will you go if the airport you departed is below landing minimums? Have a plan.

SOPs

- Final items AFTER CLEARED FOR TAKEOFF
  - Make sure ‘killer items’ are properly set.
  - Aircraft specific but generally include:
    - Flaps
    - Fuel - correct tank(s)
    - Trim(s) set
    - All lights on
    - pitot heat (any limitation?)
    - Ignition if turbine
    - HSI or DG/Heading bug
    - Transponder ALT

SOPs

- On the takeoff roll –
  - Callouts? Suggested -
    - Power set, Airspeed alive, Engine instruments in the green, No annunciators.

SOPs

Gulfstream GIV crash while attempting to takeoff, KBED, Hanscom Field, MA, May 31, 2014

During the engine start process, the flight crew ***neglected to disengage the airplane's gust lock system***, which locks the elevator, ailerons, and rudder while the airplane is parked to protect them against wind gust loads. ***Further, before initiating takeoff, the pilots neglected to perform a flight control check that would have alerted them of the locked flight controls.*** A review of data from the airplane's quick access recorder revealed that ***the pilots had neglected to perform complete flight control checks before 98% of their previous 175 takeoffs in the airplane, indicating that this oversight was habitual and not an anomaly.***

Lack of SOPs

SOPs

What's your takeoff profile? Do you have one?

Does the airport have a departure or noise abatement procedure? Most do in populated areas.

When to reduce power? When to clean up? Per the AFM.

SOPs After takeoff

SOPs

- Single pilot, when do you turn on the autopilot after takeoff, IFR or VFR? 500'? 1000'?
- Or do you hand fly up to altitude?
- What are the autopilot limitations in the airplane you fly?

SOPs – crew or single pilot

- After takeoff, during climb, ’call outs’
  - Example, climbing to 4,000’, as you climb through 3,000’ say “3,000’ for 4,000’, 1,000’ to go” and hold out your index finger for both to see, as a reminder.

  - Years ago, when flying a Metroliner as co-pilot we did this EVERYTIME on climb and decent; 1,000’ to go, 500’ to go, 200’ to go. It ***reinforced altitude awareness*** and prevented altitude busts. Because we did NOT have an autopilot. All hand flying. ☺ Sometimes 8 legs a day.

SOPs

Then, when climbing through 3,500’ for 4,000’ say “500’ to go” and hold out your hand, 4 fingers and thumb

SOPs

Then, when climbing through 3,800’ for 4,000’ say “200’ to go” and hold up 2 fingers.

SOPs En Route and Fuel Management

SOPs

What’s your in flight, en route SCAN? Depends on your cockpit.

Or do you have an en route scan?

Steam or Glass? Avidyne, Garmin, Dynon, Aspen, Collins, etc.

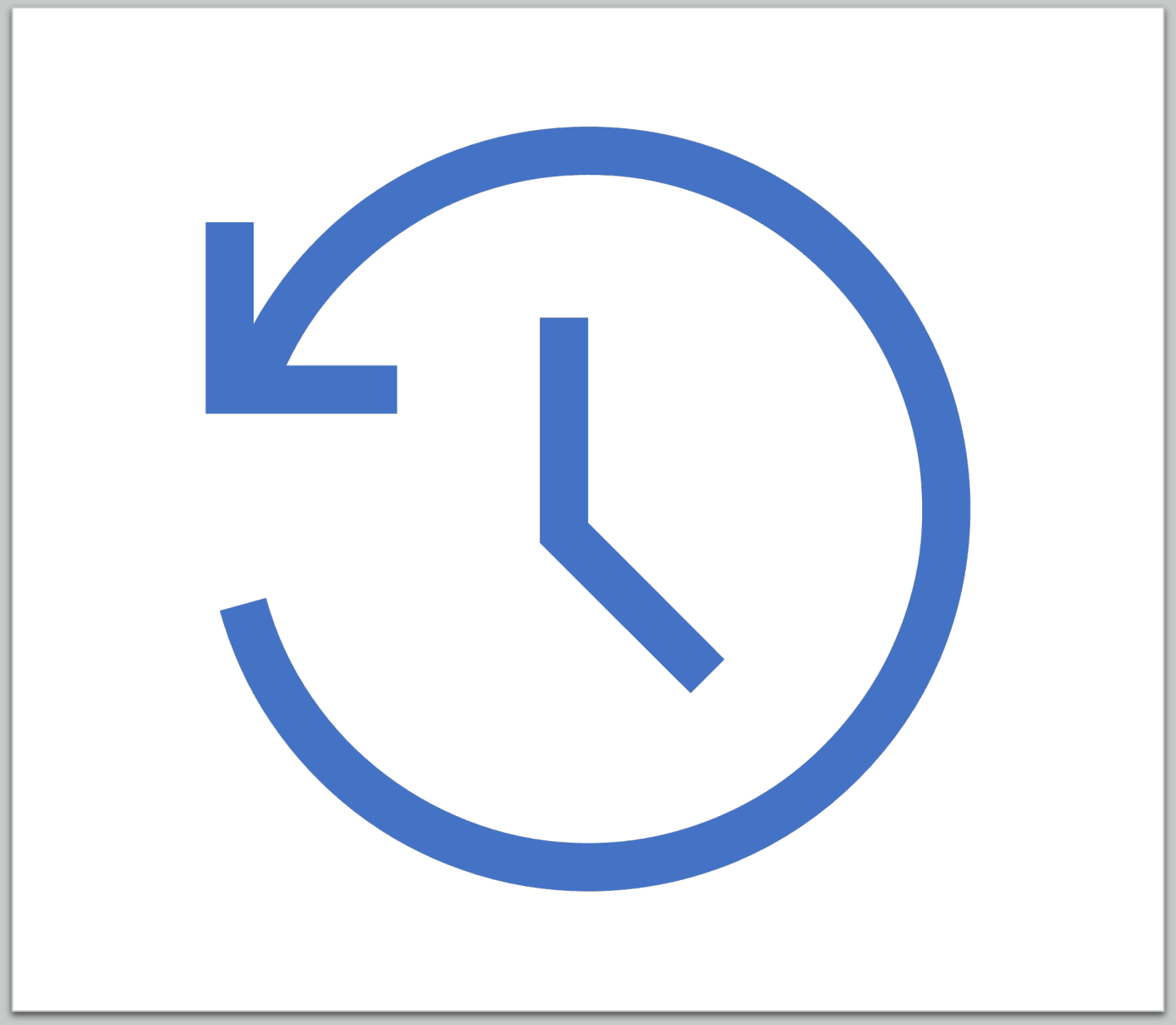
Also, how much do you hand fly or use the auto pilot?

SOPs

- Navigating en route.
- Do you have a glass cockpit or steam?
- If glass, how are your avionics set up?
- With glass, suggest 1 display on moving map and 1 on flight plan

SOPs

- Depending on what you fly, how do you manage fuel?
- Does your avionics remind you to change tanks?
- Or time/fuel remaining?



SOPs

From the NTSB: “Within fuel-related accidents, fuel exhaustion and fuel starvation continue to be leading causes.

From 2011 to 2015, an average of more than 50 accidents per year occurred due to fuel management issues.

Fuel exhaustion accounted for 56% of fuel-related accidents while fuel starvation was responsible for 35% of these accidents.”

SOPs

- How many tanks do you have? Do you switch tanks? When? Any reminders?
- How much fuel do you land with? More than the FAR's require?
- FAR 91.151 Fuel Requirements for VFR flight, during the day, to the first point of intended landing, then 30 minutes. At night, 45 minutes.
- FAR 91.167 Fuel Requirements for flight in IFR conditions, without an alternate, destination + 45 minutes
- Hopefully, you are planning to land with at least 1 hour of fuel onboard.

SOPs
Approach and landing

SOPs

Colgan Air 3407 accident, DHC-8

Crashed while on approach to KBUF, Buffalo, NY

SOPs – Colgan Air Crash NTSB Excerpt

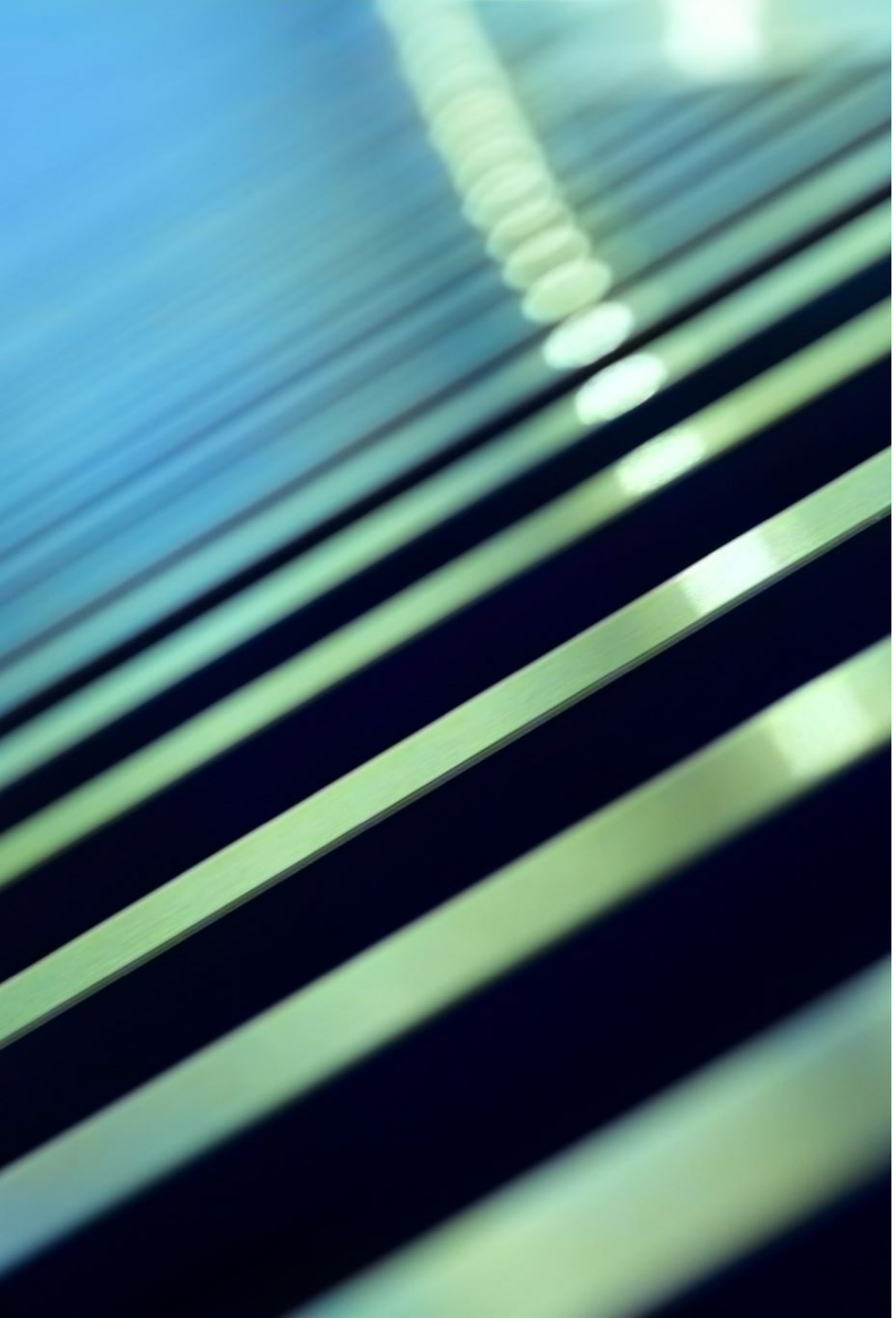
- The safety issues discussed in this report focus on strategies to:
- Prevent flight crew monitoring failures
- Including pilot professionalism, fatigue, remedial training, pilot training records, airspeed selection procedures, stall training, Federal Aviation Administration (FAA) oversight, flight operational quality assurance programs, use of personal portable electronic devices on the flight deck, the FAA's use of safety alerts for operators to transmit safety-critical information, and weather information provided to pilots
- Basically, a LACK of SOPs

SOPs

How much time/experience do you have in what you are flying?

Make and model?

Airlines refer to this as ‘high mins’ or ‘baby captain’ if you are a new Captain. FAR 121 calls for adding 100’ and ½ SM to the required ceiling and visibility for an approach, until you have 100 hours in the left seat. So, the lowest ILS you can fly is 300’ and 1SM until you have 100 hours as Captain.



SOPs

For GA, some aviation insurance companies require similar experience when qualifying in a high performance single or twin.

Very conservative.

Can be applied to any make/model of aircraft you are stepping UP to; especially if -

High performance/complex; Bonanza/Arrow/Mooney/Cirrus, etc.

SOPs

Less than 250 hours PIC make/model and less than 2000 hours total time as PIC;

Underwriter approved XX Initial or recurrent training within last XX months

Pilots with LESS THAN 500 hours total time shall complete 100 hours of training or supervised solo with an insurance approved (experienced) CFI

Landing minimums no less than 800’ and 2SM visibility for non-precision approaches, 600’ and 2SM visibility for ILS.

Runway required must be at least 30% longer than required;

Crosswind is less than 10Kts.

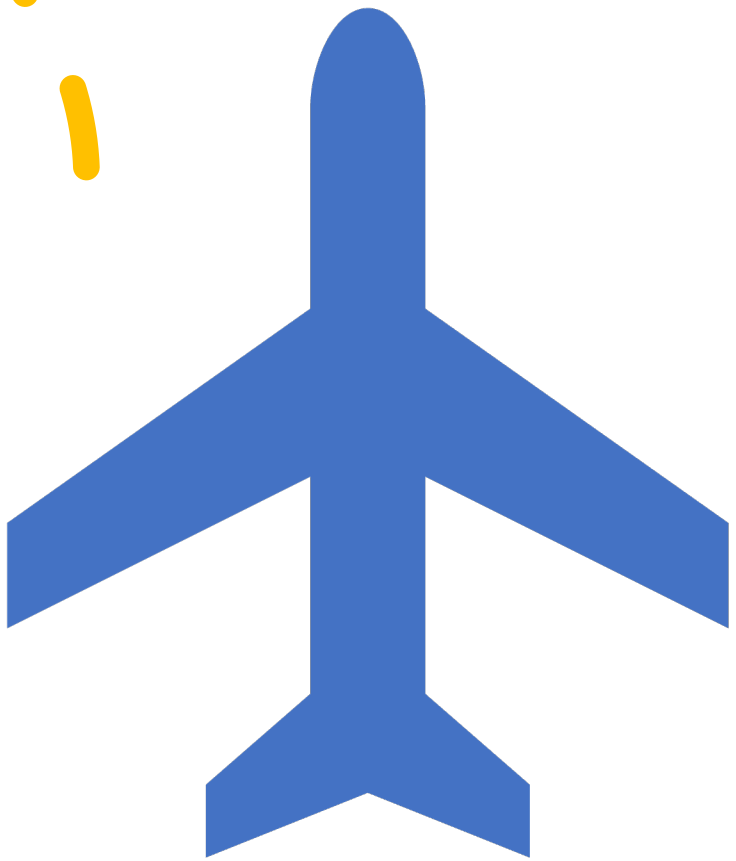
SOPs

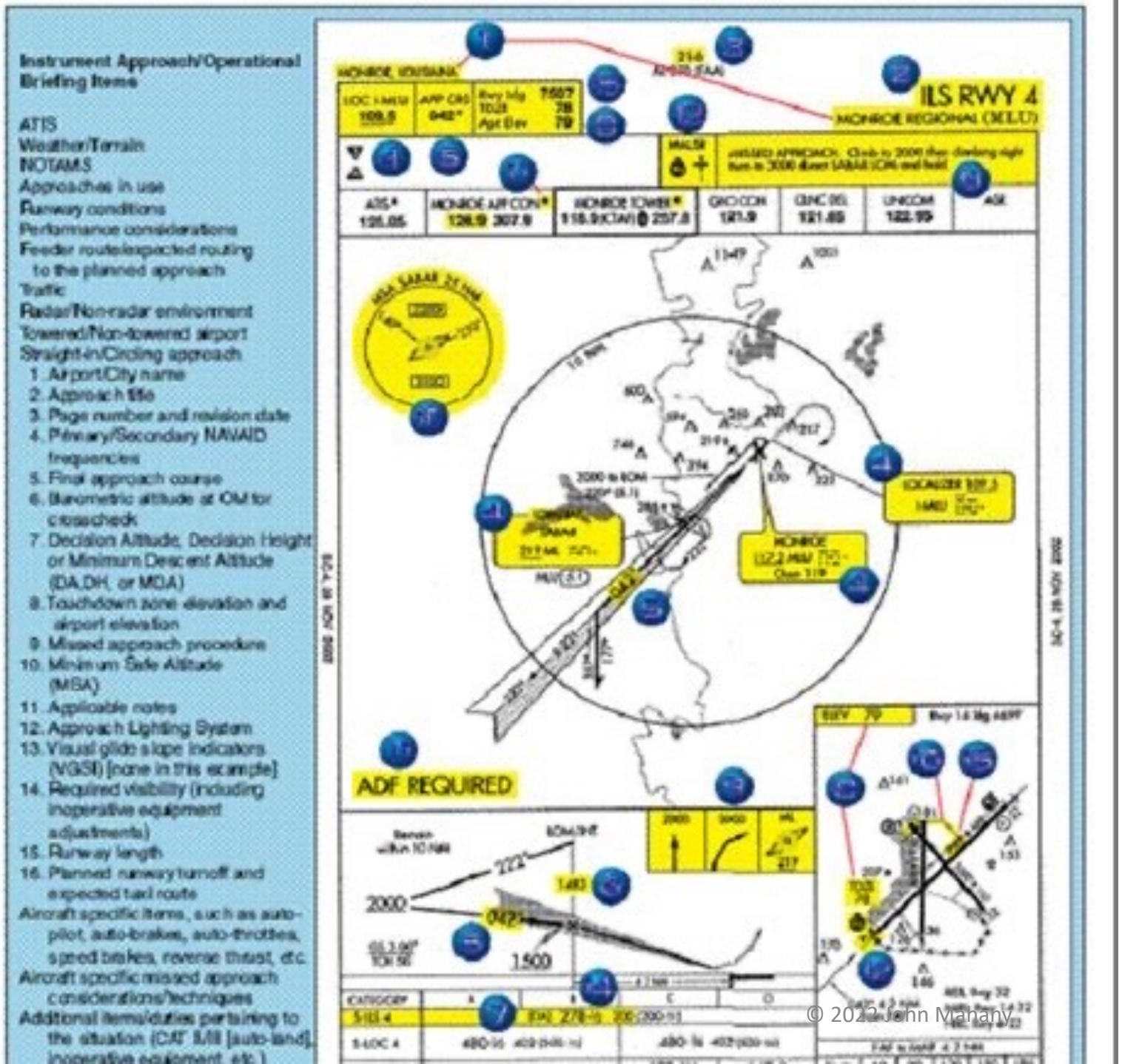
Do you have an approach briefing?

What about callouts on the approach?

SOPs

- Approach briefing –
  - Completed while at cruise, before starting on the approach
  - While on auto-pilot or in level flight
  - ATIS confirms approach and runway in use.





SOPs

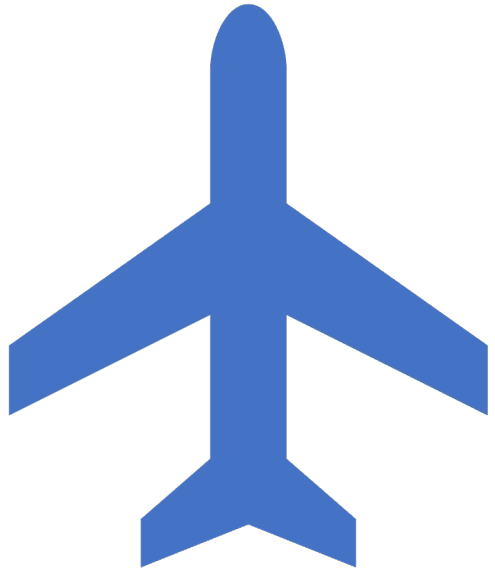
Approach plate briefing

Learjet crash, San Diego, KSEE, Dec. 27, 2021

- Requested circling clearance from the tower
- Circling minimums; MDA 1440’/ 1 1/2SM; the Lear was at 775’.
- Was this approach properly briefed?
- Was it a stabilized approach?

SOPs

- Depending on the aircraft
  - When to configure (flaps/gear) for the approach? For an ILS, have you heard of the ‘glideslope schedule’?
    - At 2 dots above intercept, flaps ½ or ‘approach’ or as appropriate
    - Then at 1 dot, gear down if flying retract,
    - At ½ dot, landing flaps per AFM or when landing assured.
    - At g/s intercept, with appropriate speed reductions, aircraft is fully configured and established on glideslope at approach speed.

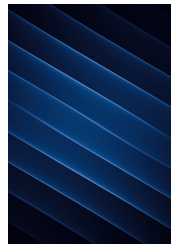


SOPs

- For a non-precision approach –
  - Crossing the FAF, Flaps 1/2 or as per AFM, gear down if retract
  - Descend to MDA at or before MAP, unless VNAV equipped
  - Landing flaps when landing assured
  - Should be stabilized (configured on speed) by 1000’ if IFR and 500’ if VFR
  - IF not, go around!

SOPs – Flying a stabilized final approach

https://www.faa.gov/news/safety_briefing/2018/media/SE_Topic_18-09.pdf



A pilot is flying a stabilized approach when he or she establishes and maintains a **constant angle glidepath** towards a predetermined point on the landing runway. Every runway is unique, but a **commonly referenced optimum glidepath follows the "3:1" principle.** The principle, also seen as a descent ratio, means that for every 3 nautical miles (nm) flown over the ground, the aircraft should descend 1,000 feet. This flightpath profile simulates a 3° glideslope.

A stabilized approach – what it looks like

SOPs

- Call outs on the approach – similar to this -
  - 1000’ above minimums
  - 500’ above minimums
  - Approaching minimums
  - Approach lights or Runway in sight (11/12/1) O’Clock
  - Or, no runway, missed approach

SOPs

How many times to fly an approach after a missed approach?

Anyone can ‘screw up’ once as ‘something’ goes wrong, not stabilized or a bad vector.

What’s recommended; depending on the weather and fuel, after a missed approach, allow one more attempt at the approach, and then divert to a suitable alternate airport. Do NOT burn into your alternate fuel. It may be needed. Never know.

SOPs

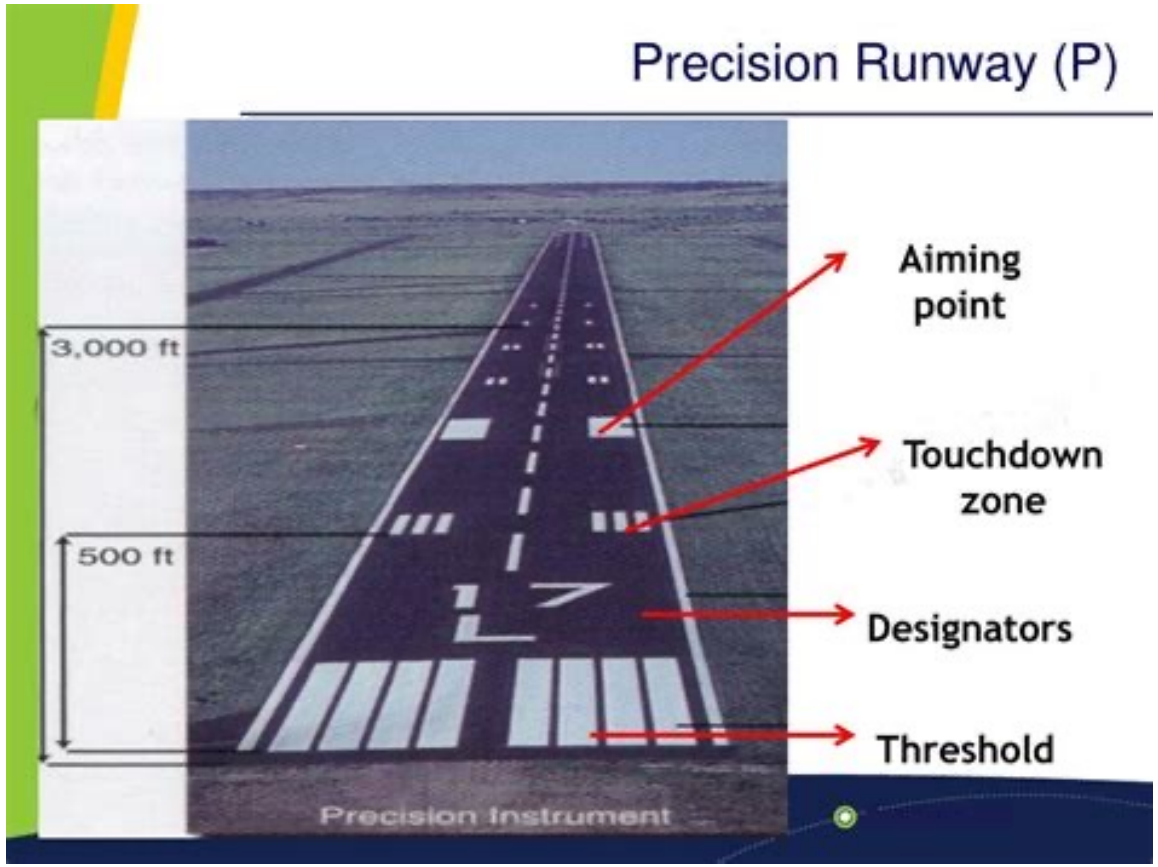
- How low can you go?
  - Per FAR 91.175 What's required?
    - The Threshold
    - Threshold Markings
    - Threshold Lights
    - Runway End Identifier Lights (REIL)
    - VASI
    - Touchdown Zone or TDZ Markings
    - TDZ Lights
    - The Runway or Runway Markings
    - Runway Lights
- How often do you take a CFII or safety pilot to practice?

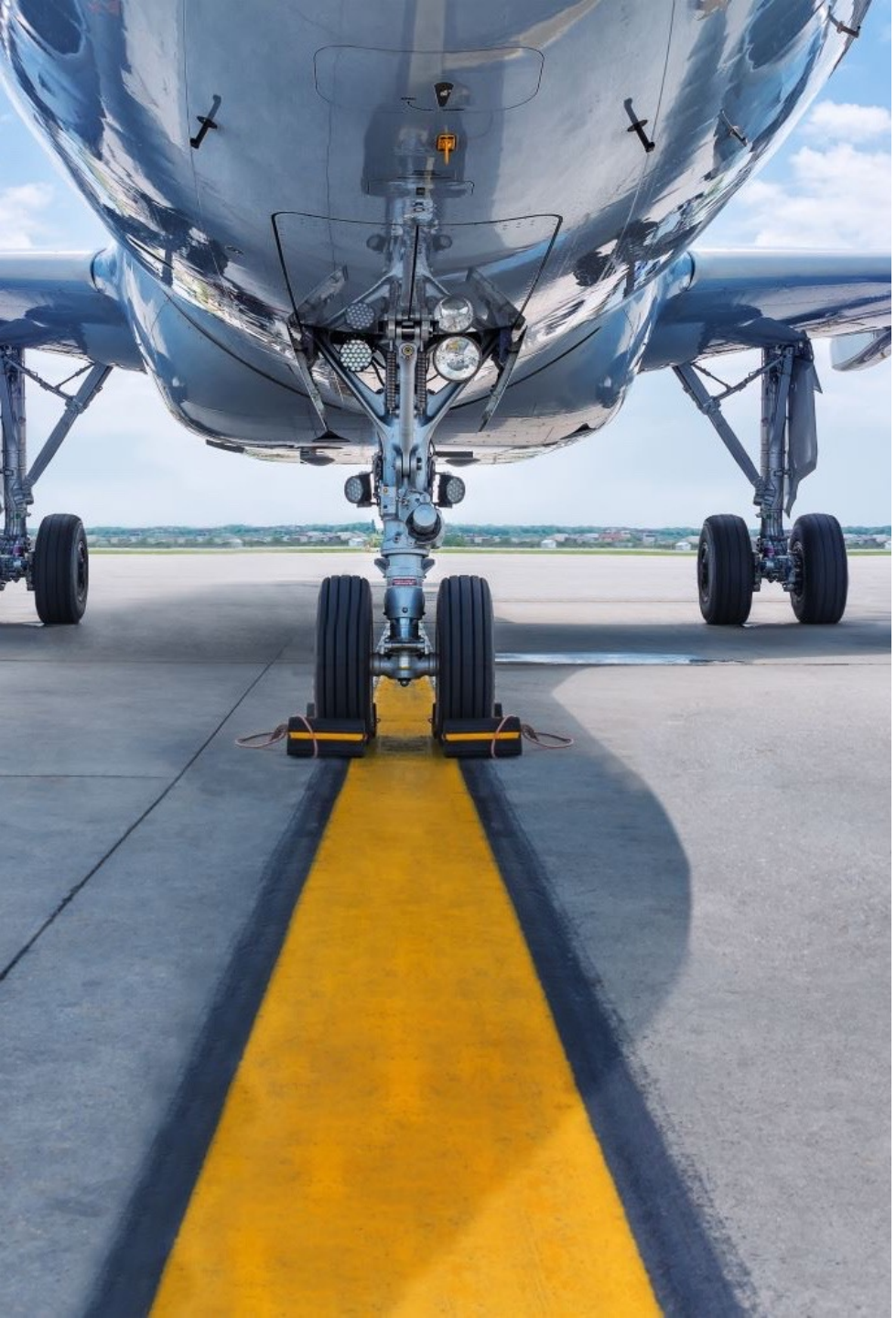
SOPs

- When is an alternate required? FAR 91.169 (b) (2) (i)
  - When the destination airport weather is forecast to have a ceiling less than 2000’ above the airport elevation, and visibility of 3SM, for 1 hour before and 1 hour after the ETA.
- For FAR 91 flight planning, what are the weather requirements for an alternate? For an ILS, ceiling at least 600’ and 2SM visibility. For a non-precision approach; ceiling 800’ and 2SM visibility. Or as specified for a particular airport and an approach, especially in mountainous areas.
- What about for a 1 runway airport? You should *always plan an alternate airport for a single runway airport*, in case of an unexpected runway closure. It’s happened to me, due to a disabled aircraft on the runway.

SOPs

- On landing, aim for the touchdown zone. Stay on centerline.
- **Don't get distracted with 'cleaning up'** flaps etc. until well clear of the runway, ***and you have crossed the 'hold short' markings.***
- **Aircraft control is primary**. Especially on 'contaminated' wet or icy runways. Apply brakes as needed and slow to a safe speed ***BEFORE*** exiting.
- ***Don't put a side load on the tires*** by turning before slowing.





SOPs

- After crossing the Hold Short markings
- Call Ground and then clean up aircraft/do after landing checklist
- Taxi to ramp
- Parking and shutdown checklist
- Secure aircraft

SOPs

Per Past NTSB Chair Robert Sumwalt, as mentioned in Business & Comm'l Aviation's 2022 Q1 issue -

"…As mentors, we have an obligation to model good behavior by following procedures, insisting on proper checklist usage and exercising professional flight deck discipline. Don't hesitate to point them to these accident reports. The story they tell is powerful: Professionals do the right things, even when no one is watching."

SOPs

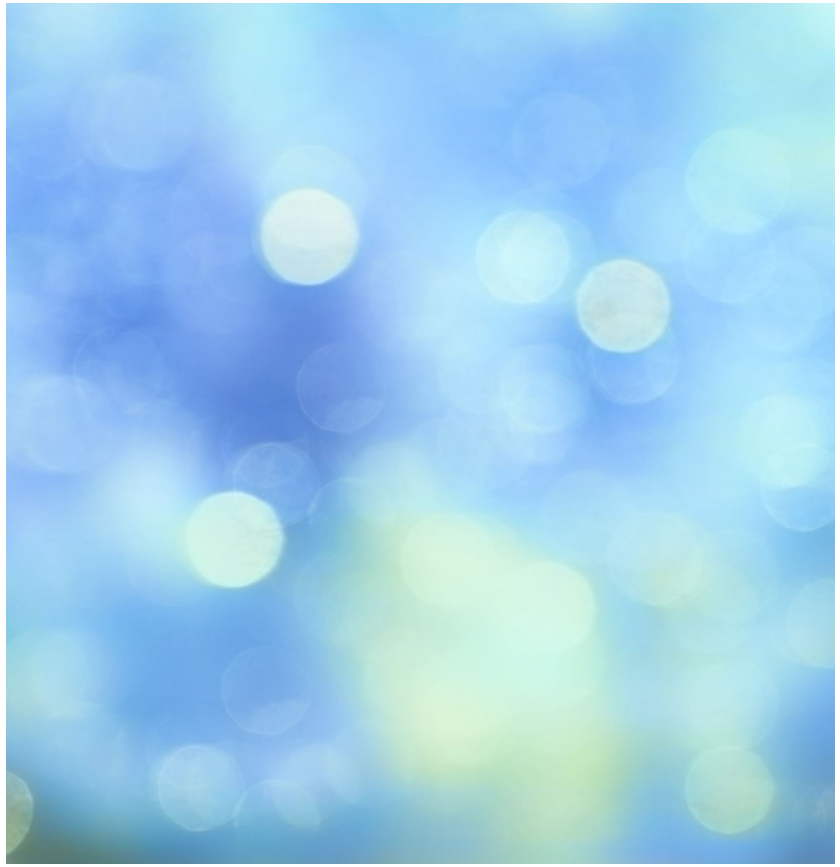
Kudos go to

IFR Magazine and Ms. Elaine Kauh, who wrote Using SOPs in GA

Originally published August 10, 2016, and updated November 12, 2019

Max Trescott, host of the Aviation New Talk podcast, Feb. 14, 2021, which discussed SOPs

Do you subscribe to IFR? Good if you do! If not, I highly recommend it!



SOPs

- Thank you for your attendance
- Hopefully this has been worthwhile and informative
- Fly safely!

Contact info

- johnmahanycfi@gmail.com
- www.johnmahanycfi.com
- 562-234-8423