CITATION JET PILOTS ASSOCIATION

STANDARD OPERATING PRACTICES

for

CITATION SINGLE PILOT OPERATIONS

Legacy Citation Series

(Various Avionics Configurations)

Thank you for your consideration and use of the CJP Safety & Education Foundation, Inc. ("CJP") standard operating practices ("SOPs") for operators of Citation aircraft.

These SOPs are provided to CJP members as a tool to guide and supplement the safety of flight actions of the owner and pilot in command of Citation aircraft. They are a set of best practices taken from various industry sources compiled by the CJP Safety Committee. In the case of any conflict between the SOPs and Federal Aviation Regulations or Federal Aviation Administration policy (together "FARs"), the FARs shall supersede the SOPs. Also, the SOPs do not replace definitive materials such as the approved and current Airplane Flight Manual, Operating Manual or related official documentation from the manufacturer or sub-system vendors (such materials are "Official Documentation").

Any user of the SOPs, whether an owner or pilot and whether or not acting as the Pilot-in-Command (PIC), is responsible for verifying the appropriateness and applicability of any action or set of actions in the SOPs against the FARs and Official Documentation. Such verification should reference official sources of information for any particular Citation aircraft, such as the approved and current Airplane Flight Manual provided by the manufacturer. Furthermore, the SOPs may not flag or provide guidance on every safe practice or flight condition. As always, the PIC shall be responsible for gathering all relevant, authorized information before making decisions related to the safe and legal conduct of a flight.

No express or implied warranty is given for the accuracy of the information contained in the SOPs. The accuracy and completeness are not guaranteed and CJP shall not have any liability for the use of the SOPs.

By accepting the SOPs from CJP, you agree to use the SOPs at your own risk and agree to indemnify and hold harmless CJP (including its officers, directors, committee members, employees and contractors) from any losses, financial or otherwise, claims, damages or other expenses that occur directly or indirectly in connection with your use of the SOPs.

Failure to read or understand this disclaimer, in no way absolves the user of his or her responsibility to be familiar with its contents. If you do not agree to be bound by all the terms set out herein, do not use the SOPs.

Objectives

The Citation Jet Pilots Association Safety Committee prepared this guide for our Members to promote increased levels of safety in operating our Citation Jet Fleet. The use of Standard Operating Practices is common in crewed corporate aircraft, commercial airline and military aircraft flying and has been shown to have a dramatic effect on safety. The philosophy behind SOPs is to establish a discipline that allows flight operations to be performed the same way each time. We set a standard practice and stick with it. Proper and consistent use of checklists, flows, memory items and these SOPs creates a standardized system whereby pilots become immediately aware of any departure from the normal sequence of events or normal system operations.

In using this guide, it is important to distinguish between *procedure* and *technique*. Procedure is that which *must* be done, or which must be done in a proscribed manner. For example, it is procedure that the frequency for an ILS must be loaded prior to executing the approach. Technique is *how* something is accomplished, when room exists for it to be safely accomplished in a variety of manners. For example, one pilot may manually enter the ILS frequency; one may load the approach in the GPS and let the frequency auto-load. The idea behind these CJP Standard Operating Practices is to adopt the best techniques in our community and make them our Standard Practices.

This CJP SOPs Guide is divided into three parts, the first being general and applicable to all Citation models. Part 1 is what we expect all of our members to operate to, designed to allow for an optimal level of safety beyond the minimum standard expressed in Part 91 of the FARs. Further above the standard of Part 1 is the CJP Gold Standard, the achievement of which indicates a pilot's commitment to achieving the highest level of flight proficiency.

Part 2 provides CJP preferred operating techniques and an additional Part 2a provides model-specific techniques. There is a separate Part 2a for the 510, the Collins Proline models (CJ1+, CJ2+, CJ3 and CJ4), and the Garmin G3000 models (M2, CJ3+), which are identified by the cover page of this document. Part 3 provides expanded explanations regarding the "why's" of Part 1, as well as enhanced information regarding the "how's". The cover page reflects which version of the SOP document is presented based on the model. For legacy Citations not equipped with ProLine 21, G1000 or G 3000, Part 2a is omitted. Those configurations will be addressed in greater detail in later revisions to the SOPs.

This guide was drawn from a number of sources, including the CJP Safety Committee members, CJP consultant Neil Singer, and the National Business Aircraft Association's Standard Operating Procedures – Fixed Wing Guide. Voluntary adoption of the NBAA SOPs has reduced the number and severity of accidents involving their members. In many organizations, SOPs are referred to as Procedures and must be followed. We recognize that CJP members, as single pilot owner/operators retain the latitude to choose their own methods and techniques, so we use the term Practices as opposed to Procedures here. These CJP SOPs are tailored from the NBAA guide to apply to the challenges associated with single pilot/owner-pilot and small flight department operations typical of CJP members. The CJP Association leadership encourages our members to adopt these SOPs into their own operations and to provide feedback that will allow us to continue to integrate the best operating techniques into future revisions. Our Simulator Training Providers are prepared to use them in your refresher training to further build consistency.

For the purposes of these SOPs, "safety pilot" is defined as a pilot, who at a minimum, meets the requirements of FAR 61.55 to be an SIC in the aircraft being flown.

Part 1: General Standard Operating Practices (All Citation Models)

I. Pilot Physiological Considerations

Duty Day guidelines ensure adequate rest for the PIC:

a) Limit flying to no more than 8 hours of flight time in any calendar day.
   -If a safety pilot is used, the PIC may extend this limit to 12 hours in a 24-hour period.
b) Do not extend a duty day in excess of 14 hours. Duty day begins at the start the day's activities (flying related or not) and terminates upon completion of the last flight of the day.
   -If a safety pilot is used, the PIC may extend the duty day to 16 hours.
c) Limit duty day to 8 hours if the flight is operated at circadian low (0200 to 0600 in time zone pilot is operating from).
   -With a safety pilot this can be extended to 12 hours.
d) Any duty day of 14 or more consecutive hours will be followed by a rest period of at least 10 hours before conducting another flight, or 8 hours with a safety pilot.

Other physiological concerns include:

e) Pilots will not serve as a required crewmember within 72 hours after donating blood.
f) Pilots and passengers who engage in SCUBA dives cannot fly within 24 hours after a dive.
g) Pilots will check the AOPA FAA Accepted Medications Database, or similar source, before acting as a crew member while taking any medication, prescription or over-the-counter.
h) Maintain any beard or mustache in a manner that allows an oxygen mask to properly seal against the face of the wearer.

II. Hazardous Materials

a) Do not carry dry ice in the passenger or baggage compartment.
b) Do not carry lithium batteries in any baggage compartment.
c) Inflight charging of devices with lithium batteries is approved only with the OEM battery. Otherwise lithium batteries, including those installed in devices, shall not be charged while the aircraft is inflight.
d) Any batteries carried on board the aircraft which are not installed in a device shall have their terminal secured
e) Carry a fire containment bag in the passenger compartment

III. Flight Planning and Preparation

a) Regardless of weather conditions, designate a suitable alternate airport for all flights, with associated fuel reserve requirements. It is not necessary to file this alternate if one is not required by the FARs.
b) If the arrival airport does not have an instrument approach available, establish a contingency plan for an alternate airport, preferably that has an acceptable instrument approach.
c) If electronic charts will be utilized, have available two current copies of electronic charts on two different electronic devices, utilizing two different software packages (for example ProLine 21 Charts with iPad Foreflight Charts as backup).

d) If planning to cruise within 4000' of the aircraft's ceiling, verify via the manufacturer's performance data that the aircraft is capable of cruise flight at planned weight and forecast temperature aloft.
e) On oceanic flights do not execute a flight where a wet footprint is forecast to exist, as defined in part 3.
f) Do not conduct a flight under night or IMC conditions after a significant maintenance event until a functional check flight has been performed under day VMC.

If planning VFR:

a) Request VFR flight following for any non-IFR flight more than 25NM from the aircraft operating base.
b) Flight under VFR must be able to maintain at least 2000' above the tallest obstacle within 5 miles of either side of the planned route, otherwise file IFR.

IV. Runway Field Length Guidelines:

a) Compute takeoff/landing data before every takeoff and landing, using the manufacturer's performance data (or other approved method), and observing the following guidelines to provide adequate safety margins:
   -Count no performance benefit for headwinds.
   -If any tailwind is expected to exist, compute the penalty using 10 knots of tailwind component.
b) For landing the computed required field length must be:
   -Less than or equal to 80 percent of available landing distance if an electronic or visual descent path indicator is available to the landing runway, or
   -Less than or equal to 60 percent of available landing distance if no electronic or visual descent path indicator is available to the landing runway.

V. Surface Operations

a) Ensure all passengers are given an appropriate safety briefing that covers at least the elements specified in part 3. Consider the use of a lead passenger, when practicable.
b) If the aircraft is moved by hand on the surface, have a rated pilot seated at the controls.
c) Do not taxi, take off or land when surface winds or gusts are reported at over 50 knots at the airport of intended operation.
d) Prior to operating at airports where ice or snow covered runways are reported or anticipated, obtain runway condition and/ or braking action reports, if possible.
e) Do not operate on any surface with braking action reported as nil.
f) Write down all taxi instructions when received, and brief all relevant hotspots. If unfamiliar with airport and a complex taxi is anticipated, request progressive taxi instructions.
g) During all surface movement have visible a taxiway diagram, preferably (if available) an electronic version with aircraft position displayed.
h) During taxi have all attention focused on taxiing; only perform checklists and briefings with the aircraft stopped, and do not conduct unnecessary conversation during taxi.
i) Perform a brake check immediately after the initial movement when leaving the parking spot.
j) When operating at airports that do not have an active control tower, make a standard position report prior to any surface movement, crossing or taxiing on any runway, and before departure. When crossing any runway ensure all external lighting is on, to include strobes.

k) When crossing or taxiing on any runway, active or not, make a visual determination that no conflicting traffic exists. If there is any doubt, hold short and query ATC. If any doubt exists pertaining to an ATC clearance to cross, taxi upon, or hold short of a runway, or to a traffic conflict, query ATC for clarification.

VI. Takeoff and Departure

a) Prior to takeoff conduct a verbal takeoff briefing, including the minimum elements listed in part 3 even if single pilot.
b) Do not takeoff when the surface visibility or ceiling is less than the published takeoff minimums appropriate for the runway to be used.
c) If the weather at the departure airport is below instrument approach minimums for the expected return runway, identify a suitable takeoff alternate within 25 NM of the departure airport.
   -The current and forecast conditions for the takeoff alternate must meet or exceed FAA destination alternate requirements or the minimums for the IAP that would be used, whichever is higher.
d) When departing in IMC, use the obstacle departure procedure (ODP), if published, for the departure runway, unless an alternative procedure or route is assigned by air traffic control.

VII. Enroute

a) Do not engage in non-operationally necessary conversation when operating below 10,000' MSL, during any segment of an approach procedure, or during the last 1000' before level off during climb or descent.
b) Do not use the vertical speed mode of the autopilot during climb above 30,000' MSL.
c) Declare Minimum Fuel if the fuel state becomes less than fuel to destination plus 45 minutes at current fuel burn.
d) Declare Emergency Fuel if the fuel state becomes less than that required to continue flight at current fuel burn for 45 minutes. Divert to and land at the nearest suitable airport.

VIII. Approach and Landing

a) Only conduct a visual approach if the conditions are: at or above a 1500' ceiling, and 3 miles visibility day or 5 miles visibility night, and if the airport is in sight.
b) Do not conduct a visual approach to an unfamiliar airport at night unless the runway is served by an approach with vertical guidance.
c) Perform visual approaches at night only to runways with vertical guidance (e.g. VASI/ PAPI, ILS Glideslope, RNAV glidepath, or other VNAV guidance)
d) When flying a circle to land from an approach without an expanded circling protection area use Category D minimums
e) Circling approach minimums:
   -Visibility minimum of 5 miles at night, or 3 miles during the day.
   -Ceiling minimum of at least 500' above the circling MDA to be used.
   -At night the runway of intended landing must have VASI, PAPI, or equivalent visual vertical path guidance.
f) When flying an instrument approach in IMC or night conditions, apply appropriate altimeter corrections if the temperature of the pressure-reporting station is below 0°C.

g) Do not commence an IAP if prior to reaching the FAF, or published glideslope intercept altitude, the most recent weather reports indicate that the surface visibility is less than that required for the approach to be flown.
h) If the reported visibility at the airport of intended landing is less than one statue mile, conduct the instrument approach procedure with the autopilot engaged in the appropriate approach mode.
i) During any approach with the autopilot engaged, maintain a hand on the yoke at all times when the aircraft is below 1,000' AFL.
j) Strive for a stabilized approach. At 1000' AFL in IMC, or 500' AFL in VMC, initiate a go around if the approach does not meet all of the criteria in part 3.
k) When approaching an airport that does not have an active control tower make a standard position report on every pattern leg. On extended straight-ins, make multiple position reports, as appropriate to traffic level.
l) Do not land on any runway with a reported crosswind component, including gusts, exceeding the demonstrated crosswind component of the aircraft.
-If braking action is reported as less than good observe the following crosswind component restrictions:

Braking Action	X-Wind Component
Good	Max demonstrated
Good-Medium	Max minus 5
Medium	Max minus 10
Medium-Poor	Max minus 15
Poor	Max minus 20
Nil	Do not operate

IX. Flight Hazards

a) Practice donning your oxygen mask every 90 days.
b) Do not conduct flights in areas of freezing drizzle or rain or severe icing; continued flight into areas of moderate or greater icing should be avoided.

X. Pilot Limitations, Training and Currency

Observe the following restrictions if the PIC has less than 100 hours time-in-type, or has not flown at least 15 hours as PIC in the last 90 days:

a) Increase minimum planned fuel reserve to 1 hour, after planned flight time and flight to alternate.
b) Minimum visibility for takeoff is 1 mile.
c) On instrument approaches, increase the published minimums by one-half mile visibility and 200 feet to DA or MDA.
d) Do not conduct any approaches in IMC or at night without vertical guidance.

e) Do not land at unfamiliar fields at night unless the runway used is served by an approach with vertical guidance and functioning visual approach indicators (VASI/PAPI).
f) Do not conduct circling approaches.
g) Perform landings at a weight which allows a full stop in 60 percent of the available runway length.

When new avionics are installed such at the Rockwell Fusion, do not fly in IMC conditions or into high density airports the PIC has conducted multiple approaches and feels comfortable with the avionics.

Only act as PIC if the following minimum training and currency requirements have been met:

h) Logged in an aircraft of the same type, within the preceding 45 days, at least 1 hour of flight time, and 1 takeoff and landing, and
i) Completed simulator based recurrent training (including a 61.58) in type within the preceding 12 calendar months.

CJP GOLD STANDARD

The CJP Association recommends our members pursue additional training throughout the year to achieve the Association's Gold Standard. The CJP Gold Standard Safety Award will be awarded at the CJP convention every year. The 2018 Gold Standard includes the following:

- 100 Turbine hours during the year.
- A 61.58 check at a Part 142 simulator training provider during the past 13 calendar months.
- A second 61.58 at a Part 142 simulator training provider or six (6) hours of Citation dual instruction in an aircraft or simulator during the past 13 calendar months.
- Additional pilot's choice training during the year:
    - Ratings – e.g. seaplane, glider, rotor, ATP, warbird LOA
    - Endorsements – e.g. tailwheel
    - High altitude physiology training
    - Survival training, dunk tank
    - Spin/aerobatic course
    - Loss of Control Inflight prevention course
    - Other aircraft 142 sim course
    - Specialty training – backcountry, FAST formation, etc.
    - Ground school, Live or E-learning course recommended by CJP
    - CJP Convention attendance
    - Other accredited aviation training
    - Enroll in a CJP LOST course
    - SRM (single pilot resource management) course

Part 2: CJP Preferred Techniques

General

Verbal Callouts- Callouts serve to double check critical checklist items, maintain situational awareness and help manage information during single-pilot operations.

Pilots should develop their own verbal callouts; some examples of standard callouts are:

- "Final Clear"
- "Runway Confirmed"
- "Thrust Set"
- "Airspeed Alive"
- "70 Knots Crosschecked"
- "Positive Rate – Gear Up"
- "Two for Three Thousand"
- "1,000 feet to go"
- "Nav Source Verified"
- "Localizer and Glideslope Armed"
- "Localizer or Course Alive"
- "Localizer Captured"
- "Glideslope Alive"
- "Glideslope Captured"
- "Final Approach Fix, no flags"
- "1,000' Above Minimums"
- "500' Above Minimums"
- "100' Above Minimums"
- "Gear Down: Landing"

Headset Choice- The lightweight Telex headsets that come with many Citations simply do not block ambient noise well. Over years of training it's been found to be a matter of when, not if, pilots using lightweight on-the-ear headsets start missing radio calls, especially as the flight progresses and hearing fatigue sets in. The noise in light jet cockpits tends to be dominated by higher frequency sound such as from windshield bleed air, "wind" noise (increasing as a function of indicated airspeed), and environmental system fan noise. This noise isn't reduced well by ANR systems, so some level of passive blocking is needed, better provided by in-ear (e.g. Clarity Aloft), or over-ear (e.g. Bose) headsets.

Recommendations on Exterior Light Use- The use of exterior lights has become standardized; the following represents industry best practice and FAA recommendations:

- *Nav lights* tell others that the aircraft is powered. If the switch is always left in the on position, a pilot can confirm the plane is depowered from the outside by viewing the nav lights.
- *Rotating beacon* illuminated is a sign the aircraft has one or more engines running or is about to start engines- turn this on immediately before engine start, and turn off when both engines are shutdown.
- *Strobe lights* should be illuminated when crossing a runway, holding in position on a runway, or taking off. They should remain on during flight unless they are creating a distraction (e.g. night flight in dense IMC).

- *Landing lights* should be illuminated when crossing a runway or taking off. They should remain on until reaching 18,000' for collision avoidance purposes. If a recognition setting is installed, switch to it shortly after takeoff until 18,000'.

Preflight

Use of Nose Baggage For "Airplane Stuff"- Store pitot/ static wick covers in the right-hand nose compartment. This forces opening the door, and encourages regular check of the pneumatic and fluid levels in the nose.

Unpressurized Baggage Area- Do not place any bottles, liquids, cans, makeup, coolers, etc. with contents under pressure that could explode in baggage- remove and place in cabin. Specifically ask passengers about this, as many will not consider it unless prompted.

Second Walkaround and Final "45 degree" Check- Always perform a second walkaround after the official preflight, paying particular attention to fuel caps, towbars, and baggage/ access doors latches and locks. Stop at a point about 45 degrees off the longitudinal axis of the plane, and look under the plane for chocks, debris, etc. Pilots often intend to "get back to something", and then forget it wasn't accomplished. Chocks and baggage doors are the most notorious examples.

Walkround And Cockpit Setup After Maintenance- Spend extra time during preflight and cockpit checks after a plane has had maintenance performed. Particularly likely to have been altered and not returned to desired state are: switches (esp. bleed source, boost pumps, ignition), avionic settings, circuit breakers, and access panels.

Startup

Startup mnemonic- Events occur so quickly during the start of a small, light-weight jet engine that a pilot can easily overlook a major parameter if the start is not monitored with a tightly scripted and practiced scan. Once the pilot establishes N_2 rotation is occurring, an ideal order of scan is: ignition active, fuel flow as expected, oil pressure rising, N_1 rotation, then ITT light-off: "IFONI" taking the first letter of each. Pilots who use the same specific scan for every start are far more likely to catch an anomaly than those who quickly glance over the instruments, or focus entirely on the ITT gauge.

Pretaxi Checks

Check HSI to compass- Prior to flight check the HSIs headings to each other and the wet compass heading. Up to ten degrees difference is common- another way to check the heading is when taxiing in a straight line, the ground track line should point straight up to the top of the HSI, not off to the side at all.

Boxing Controls- The correct procedure to check flight controls free and correct is to make a "box" with the yoke. Start with yoke full left, hold it there and move it full aft, hold full aft and move full right, hold full right and move full forward, hold forward and move full left. This ensures no constriction in the "corners" of yoke travel- something which would not be discovered with the common left/ right followed by aft/ forward check. Also check rudder freedom.

Flight Controls Free and Correct- Many pilots simply verify the control surfaces move when the yoke is moved- this is a dangerous habit! Several accidents have occurred when airplane's controls were rigged backwards after maintenance- i.e., a left yoke input resulted in the aircraft rolling right. Merely looking for movement of the surface in question would not detect such a problem- the PIC must verify that the surface moves in the *correct* direction. Left yoke should result in the left aileron being raised, and aft yoke should result in the elevator moving up (the elevator may not be viewable in some aircraft). These facts should be committed to memory, and correct movement checked on every preflight.

Setting up Flight Director for Takeoff- The lateral mode to select for takeoff will vary according to the nature of the departure clearance:

Case 1: Runway heading is assigned
-Set bug to runway heading, press TOGA button, then HDG

Case 2: Heading other than runway heading is assigned
-Set bug to assigned heading, press TOGA. At or above 400' AGL press HDG
This technique minimizes the button pushing and knob twisting that needs to be done at low altitude during a busy phase of flight. Pilots will often ask about perceived danger of taking off in only roll mode if an engine is lost. If terrain in the immediate airport vicinity is threatening, there will likely be a departure procedure to be flown, and the pilot will be tracking that course from liftoff. Given the relative risk of engine failure (low), versus task saturation during early takeoff (historically proven to be high), we want to manage the more present threat first.

Case 3: RNAV departure, typically first leg is runway heading to 400' or more
-Set bug to runway heading, press TOGA, then HDG, then NAV (ensure in magenta needles first)

Taxi

No Checklist/ Avionics Setup While Taxiing- Absolutely no activity except for taxi and necessary radio calls should be conducted while taxiing single pilot. No checklists, no checking flight controls/ trim, etc. All attention should be on taxiing and maintaining SA on the ground. Conduct the pretakeoff briefing immediately before commencing taxi while still on the ramp.

Always Have Taxi Diagram Out, Electronic is Best- In the past several years, the FAA has placed runway incursion avoidance at the top of their action list. In response, many Part 121 operations now make it a requirement that one crewmember have out and available a taxiway diagram for all surface operations. If the airplane is moving, an electronic airport chart should be displayed (if installed).

Radio 1, 2 use- Best practice is to make all radio calls on the number 1 radio, including calls to ground. COMM2 is for ATIS/ AWOS/ FSS/ and 121.5 only. This is in accordance with nearly every other industry best practice on radio use. Switching from ground on COMM2 to tower on COMM1 leaves a pilot open to the possibility of forgetting to switch. At a smaller airport, the same controller may be working ground and tower, and thus issue a takeoff clearance over the ground frequency (not realizing the pilot called on ground). The pilot gets in the air, still transmitting and receiving on COMM2 and attempts to contact approach with no luck. Workload and confusion increased at a very critical (low altitude, transition to IMC) time.

Monitor 121.5- After 9/11 the FAA issued a NOTAM requiring any aircraft capable of doing so to monitor 121.5 in flight. After ATIS is acquired, place 121.5 in COMM2 and leave COMM2 receiving on the audio panel. This can be helpful if you miss a handoff and have traveled out of range of your last frequency. ATC may attempt to contact you on 121.5, but you won't know if you're not monitoring.

"Clear right, clear left, cleared across"- Prior to crossing any runway, active or not, at a towered or non-towered airport, look right, say "clear right", look left say "clear left" then say "cleared across". The same should be conducted before taking the active with "clear on final, clear the wrong way (aircraft landing downwind), clear on other runways, clear for takeoff (or line up and wait)". Additionally, all lights should be turned on prior to crossing an active runway, and turned back off when clear on the far side.

"Line up and Wait" or "cleared for takeoff", All Lights On- This makes the aircraft more visible to any other aircraft on final, crossing the runway, or taking off or landing on an intersecting runway.

The one exception to this rule is for "line up and wait" at a large airport with a high volume of air carrier operations. Part 121 carriers almost universally turn the landing light on (during day operations) exclusively when cleared for takeoff. Thus, if a pilot turns on the landing lights when in position and holding, and ATC clears another aircraft to cross that runway, the crossing aircraft will likely stop, thinking the aircraft in position is about to begin the takeoff roll.

General In-Flight Operations

Periodically review the GO decision- Review the Five P's (Pilot, Plane, Plan, Programming, Passengers) periodically throughout the flight. At a minimum, this review is conducted at the cruise midpoint (for shorter flights) or hourly (for longer flights) and prior to top of descent. If the assumptions underlying the initial GO decision have changed, determine if the original plan is still valid, if and how it must be modified to meet the new conditions, or if it should be abandoned and a divert made.

Confirming Legs in FMS- Check legs of any procedures (departures, arrivals, approaches) from plate to FMS to confirm fixes and altitudes immediately after loading the procedure. This guards against errors in loading (loading incorrect procedure or correct procedure but incorrect runway/ transition), as well as against errors in the database.

Confirming All Flight Director/ Autopilot Changes Via the Status Bar- The importance of including the status bar in the primary scan cannot be overstated. A pilot's first action after pressing any button on the autopilot control panel should be to confirm the status bar now shows the mode requested, in armed or active status, as appropriate.

Confirming all FMS Changes Via the HSI and MFD- Any time any of the following are activated:

- Direct-to a fix
- A leg of the flight plan,
- A course to a fix, or
- An approach on a Garmin-based FMS (e.g. G1000, G3000, G500, G650, etc…)

the PIC should verify the expected result has occurred. This is best done by examining both the PFD- is

the expected “to” fix named and the expected course set on the HSI- and on the MFD- does the magenta line look correct?

Point at new altitude in altitude selector and say it aloud- When setting a new altitude, always “point and say” the altitude, even if operating single pilot. There is ample human factors research indicating this point and say approach works very well at trapping errors even in the absence of a second pilot.

Flying with Headset Off- If flying without a headset for a prolonged period, break the squelch of COMM 1 immediately after switching the speaker on and removing the headset. Hearing static over the speaker is a confirmation that audio is being sent to the speaker. Some Citations have a speaker inhibit button which will prevent radios from playing over the speaker, and can be easily overlooked, leading to long periods of lost comm with ATC.

Descent and Approach

Planning for Arrival Before Top of Descent- Monitor METARs via XM weather/ ACARS/ portable ADS-B if available and note weather conditions at destination to plan for type of approach, set performance if applicable, and set up and brief approach well in advance of decent. Don’t wait until in ATIS range to get airport weather info. Determine potential areas of difficulty and how those areas may be avoided and mitigated. Brief obstacles and terrain in the approach area.

Activating Approach When Cleared to IAF/ Receiving Vector- The approach should be activated (in the FMS, not on FD/ AP) when either:

- Cleared direct to an IAF
- The first vector for the approach is received

Reactivating the approach, once the approach has commenced, can lead to incorrect sequencing on the approach. If doubt exists as to if the approach was activated or not, the correct procedure is to enter the flight plan, and see if the active waypoint is a point below the approach header. If so, the approach is already active.

Vertical Speed Management: Unless needed otherwise, ATC generally expects at least a 1500 FPM descent rate if the aircraft is above 10,000’ MSL. For the last 1000’ of climb or descent, have no more than 1000 FPM of vertical speed to decrease the possibility of an altitude bust or TCAS RA. For CFIT avoidance, it is recommended to use no more than the following descent rates:
Below 10,000’ AGL: Max 3000 FPM
Below 5,000’ AGL: Max 2000 FPM
Below 2,000’ AGL: Max 1000 FPM

TAWS- Some pilots do not understand the primary value of TAWS is in the aural warnings, not in the TAWS display page. Pilots should be able to recite from memory, and execute in the airplane, the TAWS activation procedure. If a TAWS activation occurs in IMC, or at night, you should not think, but immediately execute the procedure. Many accidents that occurred with the first Ground Proximity Warning Systems (GPWS) happened when pilots ignored the warning, or tried to troubleshoot why it was occurring, rather than immediately climbing at max rate.

Setting Target Airspeed Bug on PFD during Terminal Phase/ Initial Approach- The PIC should always have in mind a minimum safe and a target airspeed for their configuration and weight. For the absolute minimum maneuvering speed, Cessna recommends additives to the calculated V_{REF} be observed: e.g. V_{REF}+30 for no flaps extended, V_{REF}+20 for approach flaps, and V_{REF}+10 for full flaps. Unless operationally necessary (e.g. conducting a circle to land), it is good practice to maintain a minimum of an additional ten knots above the minimum speed when setting a target airspeed.

For all phases of flight other than cruise or enroute descent, a practice to assist situational awareness is continual use and resetting of an airspeed bug, as the brain is far quicker to interpret a visual picture than to process numbers. If a pilot desires to fly 150 knots, seeing that the current airspeed is below a bug set at 150 provides quicker alerting during a rapid instrument scan than trying to process that the digital readout of "140" is undesirable. For most Citations, manually setting the target speed in the V_{ENR}/ V_T field is the optimal way to set this reminder.

Adjusting V_{REF} for Winds- SOP for most Citations is to add half of the gust factor, up to a maximum of 10 additional knots. E.g. for winds 12 gusting 22, add 5 knots to V_{REF}. Add the adjustment directly to the V_{REF} bug, so that the correct V_{REF} is displayed on the airspeed tape and no different flying technique is needed.

GS Altitude Check- On an ILS, checking the OM/ equivalent crossing altitude is a check of both being on the correct GS (versus a false GS), as well as a check of the aircraft's altimeter.

After Landing

Stop, Clean up, Call- Come to a complete stop after the hold short line, use the after-landing checklist (as either do-list or checklist), then call ATC. Do not attempt to clean up while taxiing.

Parking Brake and Chocks Best Practices- As soon as stopped on the ramp set the parking brake. Do not release it until both of the following have been confirmed: line personnel indicate chocks are in and engines have stopped. This protects against a line person not placing chocks adequately in front of tires, or not placing any chocks in front of tires, and only chocking the rear if parked on a slope. Even with the engines in cutoff, at high N_1 the aircraft may move forward if not properly chocked and the brake is released.

Part 3: Expanded Discussion of Rationale

I. Pilot Physiological Considerations

a, b) Fatigue is an especially insidious hazard as it has been proven to very difficult to self-assess. After 17 hours of being awake, pilots perform approximately as well as if they had a blood alcohol level of .05%, or the amount a 200 pound man would have after drinking three alcoholic beverages in 40 minutes.

c) Consideration should be given to the adjustment to the body's Circadian rhythm that occurs over days spent in a new time zone. A pilot who is only in a new time zone for a day or two should use their home base's local time, while after spending several days the local time may be more appropriate.

e) Different aviation authorities have varying guidelines on the necessary waiting time after blood donation, depending on units of blood taken, from 24 to 72 hours. The reduction in blood volume can decrease oxygen carrying capability by as much as a 10,000' elevation increase.

f) SCUBA diving will compound decompression sickness due to the compressed air breathed during dive; after diving, flying to 8,000' exposes a person to the same effects as a non-diver flying unpressurized at 40,000'. A decompression at high altitude can be fatal to someone who recently dove, even if hypoxia is completely avoided with supplemental oxygen.

II. Hazardous Materials

a) The risks of carrying dry ice on the plane are twofold. First, if the dry ice sublimates into the cockpit/ cabin area, incapacitation is a risk. On 4/29/98 a Douglas DC-8- cargo airplane was taxing to take off at the Brownsville/South Padre Island International Airport when all four occupants (three flight crewmembers and a jumpseat rider) became short of breath. All occupants donned oxygen masks, and the captain taxied the airplane back to the ramp. Sublimation of dry ice on board was blamed for the incapacitation.

Next is the hazard of pressure build up in a vessel holding dry ice that is not vented. From an ASRS report filed by a charter crew: "The passenger stated that he had intended to carry a small metal thermos with dry ice on the flight. He stored the sealed thermos in his refrigerator the prior evening. Several hours later, the thermos exploded violently, tearing off the door of the refrigerator and doing serious damage to his home. He said he wanted to share this info with the crew so they could inform the airline and others of this little-known aspect of dry ice sublimation."

b, c, d) Risk of lithium battery fires appears to be elevated when the battery short-circuits (conductive material contacts both terminals), has been damaged, or is charging.

III. Flight Planning and Preparation

a) Low weather conditions aren't the only reason an appropriate alternate should be identified, and appropriate fuel to reach the alternate carried. Airport closure due to an accident, pop up

TFR, or volcanic activity (more likely in areas where alternates are farther apart) can result in required diversion.

c) Beside protecting against hardware failure (loss of the MFD, and iPad, etc.), having two different software packages provides protection against the occasional version bug that causes repeated app crashing.

d) Multiple accidents/ incidents have occurred in light jets that attempted cruise at an altitude the aircraft could not maintain, given the temperature aloft and weight condition that existed. These events have resulted in the aircraft stalling, and large altitude loss before control was regained. Many aircraft cannot sustain flight at their ceiling at any temperature much over ISA unless very light. Even higher performance jets such as the CJ3 won't be able to maintain flight at their ceiling when at high weight if very warm conditions ISA+10 to ISA+20 exist, such as those commonly experienced over the North Atlantic.

e) A "wet footprint" exists if flight planning for an oceanic flight demonstrates that if at the equal time point (ETP) of the route (i.e. the center point in time, not distance), the plane experiences:

- an engine failure resulting in driftdown to single engine ceiling or
- depressurization resulting in emergency decent to 10,000'

the resulting increase in fuel burn would exhaust fuel before landing at any airport could be made.

A basic premise of operating jet aircraft is that no single failure should result in undue hazard to the aircraft and passengers. If a flight is performed with a wet footprint, a single failure of an engine or the pressurization system will result in an aircraft ditching in the open ocean.

<u>IV. Runway Field Length Guidelines</u>

a, b) As runway overruns represent the most common category of jet accidents, conservative planning with respect to landing performance is essential. Winds may shift from the last report, so not taking benefit from a headwind, and exaggerating the penalty of a tailwind prevents the pilot from attempting a landing without margin should the winds change.

Utilizing a safety factor for landings is prudent when we consider that the aircraft's published landing performance numbers are based on the best landings performed by a test pilot, with no variation from speed or glidepath, and maximum braking using new tires and brakes. Small variation in pilot technique can add hundreds, or even thousands of feet to the landing distance.

Use particular caution when landing at a non-towered airport when runway contamination may be present, or when weather reporting is not available.

<u>V. Surface Operations</u>

a) Passenger safety briefing and procedures, minimum elements to include:

a) Prior to boarding:
    i. Control passenger vehicle movement appropriate for the airport/ramp environment.

ii. Point out unique injury hazards of the airport ramp and hangar environment.

b) During aircraft fueling:
   i. No passengers are to remain inside an aircraft during refueling, unless the main cabin door remains open with stairs extended, and at least one crewmember is onboard the aircraft. No smoking is permitted during fueling operations.

c) Prior to Takeoff:
   i. The use and location of the passenger oxygen system, including the location of oxygen masks, emergency exits and emergency equipment.
   ii. What passenger supplied electronic devices can be used in the aircraft.
   iii. Safety Pilots shall be briefed on division of cockpit duties and expected protocols.

d) Inflight when the "fasten seat belt" sign is turned on for turbulence:
   i. The use of seat belt is required;
   ii. Stow carry-on luggage.

e) Prior to passenger deplaning:
   i. The safest direction and most hazard free route for passenger movement away from the airplane;
   ii. Any dangers associated with the type of airplane, such as wing steps, pitot tubes, engine and propeller safety zones

d) A braking action report must be evaluated with regard to its source, timeliness and changes to be expected with fluctuations in temperature. Braking action reports of "fair or poor" are acceptable if the runway is into the wind and exceeds the landing field requirement by 200%. Extreme caution shall be exercised under these conditions.

f) Writing taxi instructions is a critical step to reducing runway incursions. A sample methodology is:

(22) Runway taxiing to

— Cross

|| Hold short

⌝ Turn left

⌜ Turn right

So the clearance "Taxi to runway 22 via turn left on K, A, C, hold short of runway 27 on C" would be written as:

(22) ⌝ **K A C || 27**

When clearance to cross 27 is received, simply draw a horizontal line through the two vertical lines:

(22) ⌝ **K A C ‡ 27**

h) Only items that must be done while moving (e.g. checking proper movement of the HSI) should be accomplished during taxi. The takeoff briefing should be conducted after engine start and after all before taxi checklists are completed, immediately before calling for taxi clearance.

i) A Citation in Florida rolled into a King Air parked on the same ramp due, in part, to failure to perform a brake check. As soon as the aircraft begins moving forward, immediately check that the brakes function. It is not necessary to come to a complete stop, just confirm functionality.

VI. Takeoff and Departure

a) A takeoff briefing should include as minimum elements:

- Runway required and available for takeoff
- V speeds for takeoff
- If high speed/ low speed abort methodology will be used
- Actions taken if take off is aborted
- Actions to be taken if an engine fails at or above V_1
- Acceleration altitude
- Obstacles in departure corridor
- Takeoff alternate if one is needed
- Departure proceed to be flown if no abnormal situations occur

b) Depending on the runway lighting available, runways will typically have visibility requirements for takeoff ranging from one quarter mile visibility to as little as 500' RVR; these must be adhered to by for-hire operators. Use the lowest takeoff minimum published for the runway in question, as long as you have conducted takeoffs in a simulator set to that visibility in the past 12 months. I.e., if you wish to conduct takeoffs at 500 RVR, request and ensure you conduct several takeoffs and aborts with the sim at 500 RVR.

c) A 25 nm takeoff alternate allows for getting beyond a localized low weather situation (e.g. coastal fog), without exposing the pilot to a situation that requires prolonged flight should an emergency occur immediately after takeoff. An engine failure/ fire, or a cabin fire/ smoke situation, for example, would necessitate a rapid return to landing, and the pilot should ahead of time identify that there is an airport within 25 miles that is above approach minimums at the time of takeoff.

d) Obstacle departure procedures (ODPs) are required to be flown (in the absence of another departure procedure or radar vector being assigned) if the pilot cannot visually maintain terrain separation. Yet, because they are often not explicitly assigned, many accidents have occurred when pilots proceeded directly to the first fix on their clearance.

k) Non-towered airport self-announce phraseology examples:

"Strawn traffic, Citation Two Two Five Zulu, (position), (altitude), (descending) or entering downwind/base/final (as appropriate) runway one seven full stop Strawn."

"Strawn traffic Citaiton Two Two Five Zulu clear of runway one seven Strawn."

VII. Enroute

b) The use of Vertical Speed (VS) at high altitude creates risk of an autopilot induced-stall. If the pilot has selected a target VS that the aircraft cannot maintain, the autopilot will keep commanding a higher and higher pitch in an attempt to match the target. If pilots dislike the tendency of FLCH mode to oscillate as it attempts to maintain target Mach, the use of pitch mode above 30,000' combines the smoothness of vertical speed mode with the greater stall resistance of FLCH mode.

c) Minimum fuel does not constitute an emergency and does not give the pilot special ATC handling. It does mean the flight cannot accept any more delays enroute to destination. Pilots do NOT have to divert upon declaring minimum fuel.

VIII. Approach and Landing

d) Pilots can tell what procedures have an expanded circling area by the presence of a "C" in a box (NACO chart), or diamond (Jeppesen chart) near the circling minimums section.

f) Since 2014, pilots must make an altitude correction to the published altitudes on designated segments of instrument procedures at specified airports when the reported surface temperature is at or below a specified limit. This is due to the error present in pressure altimeters when the temperature of the reporting station (airport) is below ISA. While most airports only require correction when the temperature drops well below 0° C, even at 0° C significant error can exist. On an approach where the initial leg begins 5000' higher than the airport elevation, for example, if the airport temperature is 0° C the pilot will be flying 280 feet lower than the PFD indicates- a significant reduction of the only 1000' of terrain clearance required.

j) Stabilized approach criteria include *all* of:

- Landing gear down, speed brakes retracted, and flaps set as appropriate for approach flown,
- Airspeed V_{REF} (or as appropriate for flap configuration) -5/+20 knots
- Descent rate no greater than 1000 FPM,
- N_1 stabilized at setting appropriate for descent rate, and
- Horizontal and vertical guidance indicators less than half scale deflection.

l) Many runway excursions occur laterally, not always off the end of the runway. These are caused by the weathervaning tendency of an airplane landing with a strong crosswind on a surface with reduced friction. As the airplane slows, the rudder loses effectiveness to counteract the weathervaning, and surface friction may not be enough to allow for nosewheel steering or braking to keep the aircraft on the runway.

IX. Flight Hazards

a) Pilots operating single-pilot are required by FAR 91.211 to wear an oxygen mask when flying above FL350. Testing to determine time of useful consciousness shows that as altitude increases above 35,000' the pilot will not have much time to don a mask:

35,000' 30-60 seconds
40,000' 15-20 seconds

45,000’ 9-15 seconds

Note that the numbers above are for a slow decompression, and a rapid decompression will more than halve the TUC times.

Practice donning your mask regularly to ensure it can be consistently donned in under 5 seconds. If flying in a two pilot situation, consider removing headsets and hats above 35,000’, so as to minimize the time needed to don a mask.

X. Pilot Limitations, Training and Currency

(Low time in type): One-fourth of over 200 business jet accidents surveyed had pilots with less than 300 hours in make and model, and a Boeing study found 82% of all commercial jet pilots involved in accidents had less than 280 hours in type.

For Further Information

Many resources are available to assist the LBA Operator in customizing a training program that meets the objectives of this section:

- Aircraft manufacturer;
- Type-specific ownership clubs or associations;
- Independent CFIs, flight schools, and training facilities;
- Flight Review Guidance: http://www.faa.gov/pilots/training/media/flight_review.pdf
- IPC Guidance: http://www.faa.gov/pilots/training/media/IPC_Guidance.pdf
- FAA Risk Management Handbook, Including Single-Pilot Resource Management: http://www.faa.gov/library/manuals/aviation/media/FAA-H-8083-2.pdf
- FAA Online Training Course Catalog: https://www.faasafety.gov/gslac/ALC/course_catalog.aspx
- NBAA VLJ/TAA Training Guidelines: http://www.nbaa.org/ops/safety/vlj/
- AOPA Air Safety Institute: http://www.aopa.org/asf/

In addition, ongoing reference to external resources, such as the following examples, should be explored to stay abreast of the latest aviation safety trends and information:

- NBAA Safety Website - http://www.nbaa.org/ops/safety
- FAA Safety Website - http://www.faasafety.gov
- National Transportation Safety Board - http://www.ntsb.gov
- Aviation Safety Reporting System - http://asrs.arc.nasa.gov
- AOPA Air Safety Institute - http://www.aopa.org/asf
- Skybrary Aviation Safety Reference - http://www.skybrary.aero
- Regional, state and local associations
- Insurance carriers
- CODE 7700 website