

C172 STANDARD OPERATING PROCEDURES

TABLE OF CONTENTS

LIST OF CHANGES	3
INTRODUCTION	4
LIMITATIONS	11
FIRST FLIGHT OF THE DAY	21
BEFORE START	26
ENGINE START	29
BEFORE TAXI	31
TAXI	34
BEFORE TAKEOFF	36
TAKEOFF	40
CLIMB	42
CRUISE	45
UPSET RECOVERY	46
LOSS OF RELIABLE AIRSPEED	47
MANEUVERS	49
DESCENT	55
LANDINGS	59
AFTER LANDING	63
SHUTDOWN / SECURE	65
APPENDIX I - MANEUVERS INDEX	66

LIST OF CHANGES

Complete change history of this document can be found in the repository.
<https://github.com/ProStandards/c172-sop>

V3.0 Mar 2022

- Updated table of contents
- Upset recovery procedures
- Aircraft limitations
- Fuel selector LEFT or RIGHT on shutdown checklist
- Updated verbiage for annunciators on after start and before takeoff

V2.5 Feb 2022

- Maintenance Status added to First Flight of the Day
- Takeoff duties
- Threat and Error Management

V2.4 16 Feb 2022

- Updated Checklist
- Updated after landing flow
- Operational philosophy clarified with checklist duties
- Taxi - duties and management

V2.3 30 Jan 2022

- Introduction - Workload Management

V2.2 22 Jan 2022

- Before Start - Added Master Switch
- Added Landings Section
 - Added Go-Around Procedures
- Added Cruise Maneuvers Section
 - Added Pre-Maneuver Flow
 - Cruise Checklist Complete

V2.0 20 Dec 2021

- Pro Standards Brand
- Revision date format
- Introduction - Areas of Vulnerability
- Before Taxi - Flight Instruments Typo
- Before Taxi - Bugs removed from checklist
- Before Taxi - Departure changed to Takeoff
- Decent - Arrival changed to Approach
- Decent - Errors corrected in checklist

INTRODUCTION

OPERATIONAL PHILOSOPHY	5
AREAS OF VULNERABILITY	5
THREAT AND ERROR MANAGEMENT	6
Aeronautical Decision Making	6
No Time Threats	8
Errors	9
WORKLOAD MANAGMENT	9

OPERATIONAL PHILOSOPHY

This checklist and the operation of the Cessna C172 is designed to meet the standards of professional aviation. The intent is to prepare pilots to the highest possible standards of aviation and professionalism.

The general philosophy is DO-VERIFY method of checklists. This means all the items are completed from memory prior to doing the checklist. Then the items are verified using the checklist.

There are two categories of items, Tasks and Flows. Tasks are items to be completed by the pilot as soon as practical, in any order. Tasks are often more complex and require more attention than Flows. Tasks are all completed prior to doing the flow. Flows are quick patterns to change the configuration of the aircraft.

Once all tasks and flows are completed, the checklist can be preformed.

Checklists should always be performed in the following order:

- Memory Items**
- Quick Reference Items**
- Emergency Checklist**
- Abnormal Checklist**
- Normal Checklist**

When operating as a crew the PM (pilot monitoring) should conduct the checklists, to allow the PF (pilot flying) to maintain focus on flight path management. The PF should verify the tasks are complete, perform the appropriate flow, then call for the checklist from the PM.

When in the training environment the student will complete the checklist. To develop crew communication skills the student will verbalize the single pilot items and the instructor will verbalize the PF items.

AREAS OF VULNERABILITY

Areas of vulnerability are times during flight which deviations are most likely to occur and require prioritization of flight path management. During Areas of Vulnerability all non-critical tasks should be deferred until the aircraft is in a stable condition.

Areas of Vulnerability:

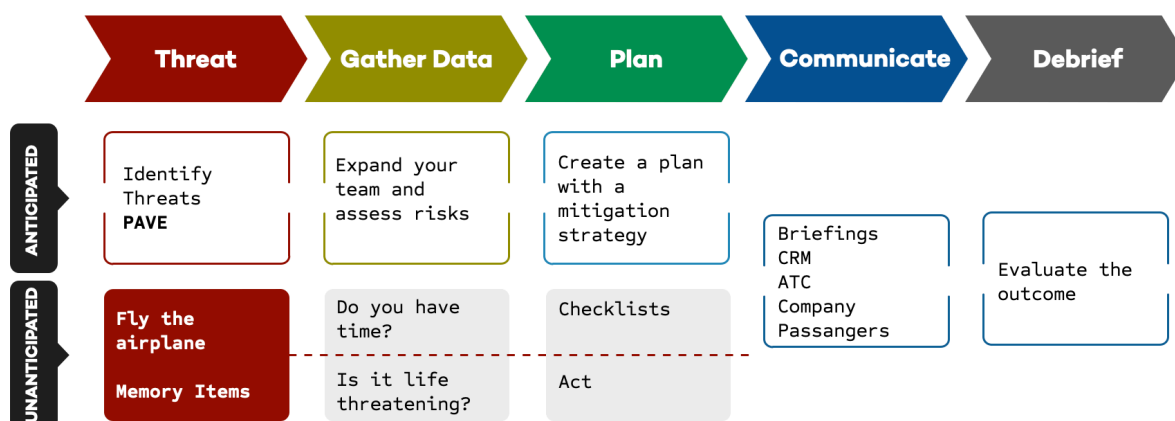
- Taxi
- Takeoff
- Within 100' of level off
- Landing
- Crossing Runways
- Steril Cockpit

THREAT AND ERROR MANAGEMENT

A threat is factor or condition that could result in an incident or accident.

An error is a mistake or slip by the pilot that could result in a deviation, incident or accident.

A risk is a threat that has been identified, briefed and considered in the pilot's plan



Aeronautical Decision Making

Aeronautical Decision Making (ADM) is the term used to describe the Threat Model. ADM has the following key comports:

- Identify threats
- Gather data
- Plan / Act
- Communicate
- Debrief

Identify Threats

The most important skill in threat identification is situational awareness (SA). Without situational awareness anticipating, detecting, briefing and mitigating threats is impossible. Situational awareness is the ability to identify cause and effect in the environment you are operating in. SA applies to the entirety of the environment and not just inside the cockpit. Developing SA takes experience, time and dedication to threat and error management.

As a place to start developing situation awareness, the FAA has given us risk identification models such as PAVE and 5Ps.

Pilot(s) - recency, proficiency, skill level, experience, IMSAFE

Aircraft - airworthiness, deferred maintenance items, suitability for the operation

EnVironment - weather, airspace, complex airports, aircraft congestion

External pressure - company, passengers, pilot motivations

Illness

Medication

Stress

Alcohol

Fatigue

Emotional Health

Anticipated threats are those that have been briefed by the PF. Unanticipated threats have not been briefed.

Gather Data

Once the threat has been identified, the PIC needs to collect information to better understand the risk being presented to the completion of the flight. We gather data by using crew resource management and single-pilot recourse management. Effectively expanding your team as the PIC is critical for the ADM process.

Inside the plane

Pilot monitoring or Instructor

Passangers

Aircraft Database

iPad Database

Company Manuals

Outside the plane

Air Traffic Control

Company

Flight Service Stations

Once information has been collected the PIC should conduct a risk analysis do formulate a plan of action. It is important to consider information bias when gathering data and conducting the risk analysis. Information bias finding data that supports the decision that you prefer to make instead of the decision that needs to be made.

Use the risk assessment matrix to analyze the severity of accepting the threat that has been presented. Consider the probability of the occurrence and the severity of the consequences if it occurred.

Probability	None	Low	Medium	High	Fatal
High					
Medium					
Low					

If the level of risk is acceptable to the PIC they can continue to the next step.

Plan

With all available information, the pilot can formulate a mitigation strategy to operate the aircraft in relation to the threat that is present. A decision must be made to continue the mission or not. If the mission is safe to continue, use the mitigation strategy to make a plan of action for operating the rest of the flight.

Communicate

In a single-pilot environment, the pilot should communicate their plan and intentions with ATC, passengers and company as necessary.

When operating with two pilots it is critical to create a shared mental model of the plan with the other pilot. Both pilots should understand the mission, means to accomplish the mission and the mitigation strategy for the encounter threats. This includes delegating PF and PM duties as necessary.

Debrief

Once the threat has been resolved and in a low area of vulnerability, the decision making process should be evaluated and suggest ways to improve the ADM skills in the future.

No Time Threats

No Time Threats require immediate pilot action to preserve life and property. No time threats include but are not limited to:

- Fire
- Smoke
- Medical Emergency
- Engine Failure below 1,000 feet AGL

After encountering an unanticipated threat the PF must fly the airplane. The flight path must be stabilized before proceeding with the TaEM model.

- Fly the airplane
- Memory Items
- Establish PF/PM

Act

This is what you train for. Use your pilot skills to get the plane on the ground as safely and as quickly as possible.

Communicate

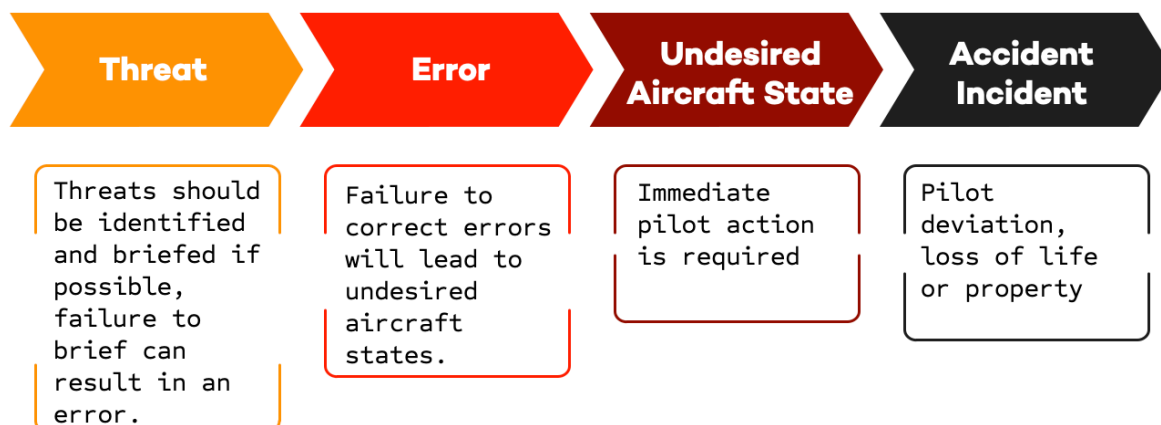
If time permits make your intentions know and squawk the appropriate emergency code.

Debrief

Once the threat has been resolved and in a low area of vulnerability, the decision making process should be evaluated and suggest ways to improve the ADM skills in the future.

Errors

An error occurs when a threat is not mitigated or a threat is introduced by the pilot. The model below shows progressive development of threats into aircraft accidents or incidents.



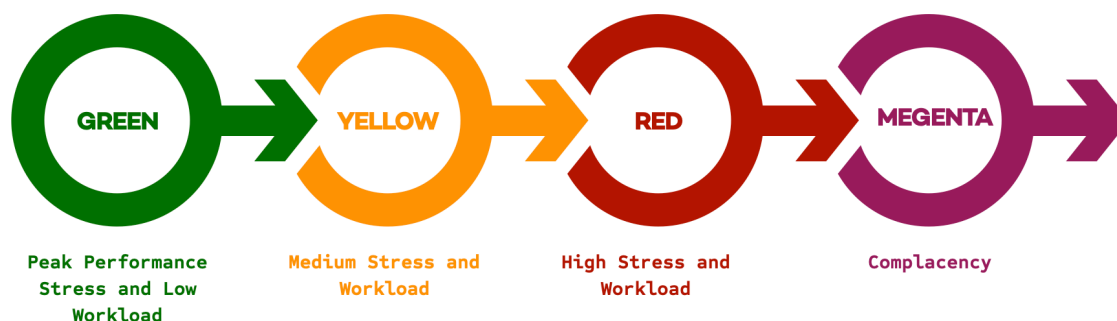
The primary means for preventing threats is by briefing. However, if a threat occurs the PIC must be well-trained and proficient in their skills to prevent errors from developing. These skills include: general piloting, workload management, checklist usage, aircraft knowledge, workload management, CRM/SRM, and ADM.

If an error occurs the PIC must recognize and correct it immediately. Failure to do so will result in an undesired aircraft state.

Failure to correct an undesired aircraft state may result in an accident or incident. The PIC must be able to recognize this situation early and correct them.

WORKLOAD MANAGEMENT

The majority of aviation accidents are caused by degradation in situational awareness from being oversaturated. It is important for a pilot to be able to identify when they have become saturated and communicate with instructor or crew member.



Green level is an appropriate amount of stress that encourages peak performance. The pilot is able to stay ahead of the airplane with situational awareness and task management.

Yellow level is when the pilot begins to be task saturated, often in the areas of vulnerability, and is no longer easily able to divide attention between tasks. The pilot may miss signals from the environment, degrading situational awareness.

Red is when the pilot is no longer able to complete the required tasks for safe flight path management. At this point the pilot needs to stop, slow down, think, and prioritize tasks. Continuing without task prioritization will most likely result in a pilot deviation or accident.

Magenta is when the pilot does not have a high workload but is missing environmental signals due to complacency. The pilot needs to recognize the distractions and prioritize tasks for safe flight path management.

LIMITATIONS

KINDS OF OPERATIONS LIMITS [POH 2-9] [GI 275 part 23 AML STC 2.26]	12
TAXI LIMITATION	13
AIRSPEED LIMITATION [POH2-4]	13
POWER PLANT LIMITATION [POH2-5]	14
POWER PLANT INSTRUMENT MARKINGS [POH2-6]	14
WEIGHT LIMITS [POH2-6]	15
CENTER OF GRAVITY LIMITS [POH2-7]	16
MANEUVER LIMITS [POH2-7] [GI 275 PART 23 AML STC 2.5]	16
FLIGHT FACTOR LOAD LIMITS [POH2-8]	17
FUEL LIMITATION [POH 2-9]	18
MINIMUM SOFTWARE LIMITATION [GI 275 part 23 AML STC 2.1]	18
NAVIGATION ANGLE [GI 275 part 23 AML STC 2.4]	18
ADAHRS NORMAL OPERATING MODE [GI 275 PART 23 AML STC 2.5]	18
PRIMARY FLIGHT INSTRUMENTS [GI 275 PART 23 AML STC 2.8]	18
SYNTHETIC VISION [GI 275 PART 23 AML STC 2.10]	19
MOVING MAP [GI 275 PART 23 AML STC 2.11] [GI 275 PART 23 AML STC 2.18]	19
TERREIN [GI 275 PART 23 AML STC 2.13] [GI 275 PART 23 AML STC 2.14]	19
TRAFFIC [GI 275 PART 23 AML STC 2.16]	19
SERVICE REQUIRED [GI 275 PART 23 AML STC 2.23]	19
DATABASE UPDATE [GI 275 PART 23 AML STC 2.23]	19

KINDS OF OPERATIONS LIMITS [POH 2-9] [GI 275 PART 23 AML STC 2.26]




	VFR	IFR
Day	Approved	Approved
Night	Approved	Approved

Flight into known icing is prohibited.

GI 275 ADAHRS requires GPS and ADC to be operational for IFR Flight.

Equipment	Number Installed	VFR	IFR
GI 275 ADI	1	1	1
GMU 11 or 44B Magnetometer	1	0	1
GI 275 HSI	1	0	1
Magnetic Compass	1	1	1
GPS	1	0	1
ADC	1	0	1

GI 275 Backup Battery Charge

	VFR	IFR
	Approved	Approved
	Approved	Minimum back up time must be no less than 30 minutes. Refer to the battery status and information found in the battery menu. (Menu → Systems → Battery)
	Prohibited	Prohibited

IFR PROHIBITED REGIONS [GI 275 PART 23 AML STC 2.2]		
Maximum Latitude	Longitude	
North of 72°N	All	
South of 70°S	All	
North of 65°N	75°W	120°W
North of 70°N	70°W	128°W
North of 70°N	85°E	114°E
South of 55°N	120°E	165°E
North of 65°N	75°W	120°W
IFR operations prohibited in magnetic variation is greater than 99.9° East or West		

TAXI LIMITATION

Maximum Taxi Speed 20 Knots on Dry pavement and 10 KTS on contaminated surfaces.

AIRSPEED LIMITATION [POH2-4]

V	SPEED	KCAS	CIAS	REMARKS
V _{NE}	Never Exceed Sped	158	160	Do not exceed this speed in any operation
V _{NO}	Maximum Structural Cruising Speed	126	128	Do not exceed this speed except in smooth air, and then only with caution.
V _A	Maneuvering Speed: 2300 lbs 1950 lbs 1600lbs	96 88 80	97 89 80	Do not make full or abrupt control movements above this speed.
V _{FE}	Maximum Flap Extended Speed	86	85	Do not exceed this speed with flaps down.
V _{WINDOW}	Maximum Window Open Speed	158	160	Do not exceed this speed with windows open.

POWER PLANT LIMITATION [POH2-5]

		Minimum	Maximum
Engine Manufacturer	Avco Lycoming		
Engine Model Number	O-320-H2AD		
Engine Operating Limits for Takeoff and Continuous Operations			
	Maximum Power		160 BHP
	Maximum Engine Speed		2700 RPM
	Full Throttle Static Range	2280 RPM	2400 RPM
	Maximum Oil Temperature		118° C
	Oil Pressure	25 PSI	100 PSI
Propeller Manufacturer	McCauley Accessory Division		
Propeller Model Number	1C160/DTM7557		
Propeller Diameter		74 Inches	75 Inches

POWER PLANT INSTRUMENT MARKINGS [POH2-6]

INSTRUMENT	RED LINE	GREEN ARC	YELLOW ARC	RED LINE
	MINIMUM LIMIT	NORMAL OPERATING	CAUTION RANGE	MAXIMUM LIMIT
Tachometer	-	2200 - 2700 RPM	-	2700 RPM
Oil Temperature	-	100° - 245° F	-	245° F
Oil Pressure	25 psi	60 - 90 psi	-	100 psi



WEIGHT LIMITS [POH2-6]

NORMAL CATEGORY			
Maximum Takeoff Weight	2300 lbs		
Maximum Landing Weight	2300 lbs		
Maximum Weight in Baggage Compartment			
	Baggage Area 1	120 lbs	82 -108 inches
	Baggage Area 2	50 lbs	108 - 142 inches
	Baggage Area Total	120 lbs	
UTILITY CATEGORY			
Maximum Takeoff Weight	2000 lbs		
Maximum Landing Weight	2000 lbs		
Maximum Weight in Baggage Compartment	Must not be occupied		
Rear Seats	Must not be occupied		

CENTER OF GRAVITY LIMITS [POH2-7]

NORMAL CATEGORY			
Center of Gravity Range			
	Forward	35.0 inches	0 lbs
	Forward	35.0 inches	1950 lbs
	Forward	38.5 inches	2300 lbs
	Aft	47.3	0 lbs
	Aft	47.3	2300 lbs
Reference Datum	Lower Portion of the front face of firewall		
UTILITY CATEGORY			
Center of Gravity Range			
	Forward	35.0 inches	0 lbs
	Forward	35.0 inches	1950 lbs
	Aft	40.5	0 lbs
	Aft	40.5	2300 lbs
Reference Datum	Lower Portion of the front face of firewall		

MANEUVER LIMITS [POH2-7] [GI 275 PART 23 AML STC 2.5]Normal Category

This airplane is certificated in both the normal and utility category. The normal category is applicable to aircraft intended for non-aerobatic operations. These include any maneuvers incidental to normal flying, stalls (except whip stalls), lazy eights, chandelles, and turns in which the angle of bank is not more than 60°. Aerobatic maneuvers, including spins, are not approved.

If aerobatic maneuvers are being performed, the GI 275 attitude solution may become unreliable and should not be used as an attitude reference during the maneuvers.

Utility Category

The airplane is not designed for purely aerobatic flight. However, in the acquisition of various certificates such a commercial pilot and light instructor, certain maneuvers are required by the FAA. All of these maneuvers are permitted in this airplane when operated in the utility category.

In the utility category, the baggage compartment and rear seat must not be occupied. No aerobatic maneuvers are approved except chandelles, lazy eights, steep turns, spins, and stalls (except whip stalls)

Intentional spins with flaps extended are prohibited.

Maneuver	Recommended Entry Speed
Chandelles	90 KIAS (PS)
Lazy Eights	90 KIAS (PS)
Steep Turns	90 KIAS (PS)
Spins	65 KIAS (PS)
Stalls	65 KIAS (PS)

FLIGHT FACTOR LOAD LIMITS [POH2-8]

NORMAL CATEGORY	Flight Load Factor Gross Weight - 2300 lbs	
	Positive	Negative
Flaps Up	+3.8g	-1.52g
Flaps Down	+3.0g	-
UTILITY CATEGORY	Flight Load Factor Gross Weight - 2300 lbs	
	Positive	Negative
Flaps Up	+3.8g	-1.52g
Flaps Down	+3.0g	-
The design load factors are 150% of the above, and in all cases, the structure meets or exceeds the design loads.		

FUEL LIMITATION [POH 2-9]

	LEFT	RIGHT	TOTAL
Total Fuel	21.5	21.5	43
Usable Fuel	20	20	40
Unusable Fuel	1.5	1.5	3
Approved Fuel Grades			
	100LL	Blue	
	100	Green	

To ensure maximum fuel capacity when refueling, place the fuel selector valve in either the LEFT or RIGHT position to prevent cross-feeding.

Takeoff and land with the fuel selector valve handle in the BOTH position.

MINIMUM SOFTWARE LIMITATION [GI 275 PART 23 AML STC 2.1]

Component	Identification	Software Version
GI 275	Multi-Function Instrument	2.40

NAVIGATION ANGLE [GI 275 PART 23 AML STC 2.4]

The Magnetic/True Navigation Angle (as selected in the MENU → SYSTEM → UNITS Page) must match the navigation angle selected on all interfaced GPS/SBAS navigators. If this is not done the navigation deviations will not be accurate.

ADAHRS NORMAL OPERATING MODE [GI 275 PART 23 AML STC 2.5]

The ADAHRS integrity monitoring uses GPS data and air data. Since the internal ADC provides full time air data, the only required external input is from an approved and installed GPS.

PRIMARY FLIGHT INSTRUMENTS [GI 275 PART 23 AML STC 2.8]

Use of QFE altimeter settings is prohibited.

SYNTHETIC VISION [GI 275 PART 23 AML STC 2.10]

The synthetic vision presentation must not be used as the sole reference for aircraft control (without reference to the primary flight instruments).

The synthetic vision presentation must not be used as the sole reference for navigation or obstacle/terrain/traffic avoidance.

MOVING MAP [GI 275 PART 23 AML STC 2.11] [GI 275 PART 23 AML STC 2.18]

The GI 275 Map page (ownship position relative to map features) must not be used as the primary or sole means of navigation or course guidance.

The GI 275 Map page shall not be used as the sole basis for ground maneuvering. The zoomed-in Map page does not comply with the FAA requirements and is not certified as an airport moving map display (AMMD).

Map page use is limited to airport surface orientation to improve flight crew situational awareness during ground operations.

TERREIN [GI 275 PART 23 AML STC 2.13] [GI 275 PART 23 AML STC 2.14]

Maneuvers and navigation must not be based solely on the display of terrain, obstacles, or wires on the moving map terrain displays.

Terrain/TAWS alerts must be inhibited when landing at an airport that is not in the airport database unless the airport can be designated as a user airport (GTN Navigator only).

TRAFFIC [GI 275 PART 23 AML STC 2.16]

The display of traffic is intended as an aid to visual acquisition and must not be used as the sole basis for maneuvering the aircraft to avoid traffic.

SERVICE REQUIRED [GI 275 PART 23 AML STC 2.23]

It is prohibited to initiate flight when a “Service Required” advisory is present on the ADI or EIS display.

DATABASE UPDATE [GI 275 PART 23 AML STC 2.23]

Database updates via USB or wireless transfers must be done while the aircraft is on the ground and stationary. In-flight database transfers or updates are inhibited in flight.

FIRST FLIGHT OF THE DAY

TASKS	21
MAINTENANCE STATUS	21
PASSENGER BRIEFING	21
CREW BRIEFING	22
AIRWORTHINESS ACCEPTANCE	22
PREFLIGHT	23
FLOWS	23
CHECKLISTS	24

FIRST FLIGHT OF THE DAY

TASKS

MAINTENANCE STATUS

Determine if it is safe to apply power to the aircraft.

If maintenance is in control of the aircraft, or there is an inoperative item, applying power could damage the aircraft or cause injury to persons.

To determine if it is safe to apply power check the following:

- 1. DO NOT OPERATE tag on the throttle**
- 2. Aircraft Status by scanning the QR code**
- 3. Maintenance Irregularities**

If any of the three items are found it is not safe to operate the aircraft.

PASSENGER BRIEFING

The PIC is responsible for briefing the passengers aboard the aircraft. The following briefing items are required:

- Smoking**
- Location of exits**
- Use of safety belts**
- Location and use of flotation devices**
- Location of survival equipment**
- Location of fire extinguisher**
- Sterile Cockpit**

Example: *“This is a non smoking flight. Safety belts are required for taxi, takeoff and landing. Use them by inserting the metal fitting into the buckle. Lift the latch to release. There are three exits on the airplane. Two front doors, lift the handle to open the door, and the aft baggage compartment door. (If required) There are life jackets in the baggage compartment. Place them over your head and tighten the buckle. There is a fire extinguisher in between the front seats. Pull the pin and aim at the fire in a sweeping movement. During taxi, takeoff, climb and landing we will keep talking to essential items only to prevent distraction.”*

CREW BRIEFING

The First Flight of the Day crew briefing is meant to establish positive communication for crew members. The following items should be briefed:

Establish the PIC
Positive transfer of flight controls
Emergency operation duties and responsibilities

Example (Student Pilot): *"I will be acting as PIC of the flight, however final authority will be with the instructor. We will use the three-step method to transfer flight controls. Initiated by saying 'my flight controls' verified by 'your flight controls' and confirmed by saying 'your flight controls.' During an emergency the pilot flying will continue flying while the pilot monitoring does the flow items and emergency checklist. Once the checklist is complete we can transfer controls if necessary."*

AIRWORTHINESS ACCEPTANCE

FAR 91.7 - The PIC is responsible for determining whether the aircraft is in a condition safe for flight. The PIC should begin by checking the aircraft status to verify the inspections are current, and the hobbs and tach time match.

Use the AVIATED acronym to check for the following inspections:

Annual
VOR Check (if required)
100 Hour
Altimeter and Pitot Static System
Transponder
ELT
Airworthiness Directives.

Additionally, The PIC should ensure the required documents are onboard the aircraft using the ARROWPC acronym.

The documents include:

Airworthiness Certificate
Registration (Federal)
Radio Operators Permit (International Operations)
Operating Limitations
Weight and Balance Data
Placards
Compass Card

The pilots documents are also required for airworthiness.

These documents include:

Pilot Certificate
Current Medical
Government Issued Photo ID
Corrective Lenses (if required)
Flashlight

iPad with current data and at least 80% charge
Backup Battery suitable to charge the iPad
Current Standard Operating Procedures
Current Checklist

When using an iPad as primary means of aeronautical data you are required to have backup data in the event of iPad failure. Current GPS database, which includes a current SafeTaxi data base is sufficient for VFR.

IFR operations require a second chart data base. This can be a second iPad or iPhone with a current database or paper copies for the departure destination and alternates.

The PIC should, by means of external inspection verify the required equipment of 91.205 are operational. If there is any inoperative equipment, the PIC should verify the deferral of the equipment is completed in accordance with 91.213(d) and does not interfere with the safety of flight.

PREFLIGHT

FAR 91.103 - The following items are required preflight action:

Runway Lengths
Takeoff and Landing Distances
Fuel Requirements
IFR Alternates
Weather Reports and Forecasts
ATC Delays

The PIC should also be familiar with all available information including NOTAMs.

An external inspection of the aircraft should be completed in accordance with the POH before each flight.

FLOWS

NOT APPLICABLE

CHECKLISTS

ITEM	SINGLE PILOT RESPONSE	PM RESPONSE	PF RESPONSE
	“First Flight of The Day Checklist”		
PASSENGER / CREW BRIEF	“COMPLETE”	“COMPLETE”	–
AIRWORTHINESS ACCEPTANCE	“COMPLETE”	“COMPLETE”	“COMPLETE”
PREFLIGHT	“COMPLETE”	“COMPLETE”	“COMPLETE”
	“First Flight of The Day Checklist complete”		

BEFORE START

TASKS	26
FLOWS	26
CHECKLISTS	27



BEFORE START

TASKS

Fasten safety belts and shoulder harnesses.

If there are sustained temperatures below 0 degrees, reference cold weather operations.

Batter Master Switch as necessary for before start operations

FLOWS

1. Battery Master Switch - On
2. Fuel Selector - Both
3. Trim - Takeoff
4. Mixture - Set
 1. Rich below 3,000 MSL, or
 2. Above 3,000 MSL the mixture should be leaned one inch of travel.
5. Interior Lights - Set
 1. During daytime operations the interior lights should be turned off and the brightness adjusted on the GPS and electronic instruments. During nighttime operations the dome light, GPS and electronic flight instruments should be adjusted to the lowest visible level. This will promote night vision. As your eyes adapt you will be able to dim the lights more.
6. Exterior Lights - Set
 1. The Nav light should remain on for all operations to indicate the application of power to the aircraft. Additionally, the Nav light should remain on during flight to power the ADS-B out. The Beacon should be turned on prior to starting the engine. The taxi light is used to indicate movement on the surface. Prior to taxiing the light should be turned on and once the aircraft is stopped (run-up or waiting clearance) the light should be turned off. Finally, the taxi light should be turned off to indicate giving way to another aircraft at taxiway intersections. The strobe light should only be used when on the runway. When crossing a runway all the external lights should be turned on.
7. Carburetor Heat - Off
8. Circuit Breakers - Checked
 1. Verify all are in
9. Avionics Switch - Off
10. Prime - As Required
 1. Check the oil temperature gauge prior to priming the aircraft. If the gauge is indicating in the green no prime is required for start. If the oil temperature is below the green use three strokes of the primer. Insure the primer is locked when complete.

CHECKLISTS

ITEM	SINGLE PILOT RESPONSE	PM RESPONSE	PF RESPONSE
	“Before Start Checklist”		
SEAT-BELTS	“CHECKED”	“CHECKED”	“CHECKED”
FUEL SELECTOR	“BOTH”	“BOTH”	–
TRIM	“TAKEOFF”	“TAKEOFF”	–
MIXTURE	“SET”	“SET”	–
EXTERIOR / INTERIOR LIGHTS	“SET”	“SET”	
CARBURETOR HEAT	“OFF”	“OFF”	–
CIRCUIT BREAKERS	“CHECKED”	“CHECKED”	–
AVIONICS SWITCH	“OFF”	“OFF”	–
	“Before Start Checklist complete”		



ENGINE START

TASKS	29
FLOWS	29
CHECKLISTS	29



ENGINE START

TASKS

Visually and audibly clear the area to ensure it is safe to start the engine. Look for any movement, people or vehicles in the area.

DO NOT START IF THE FUEL TRUCK IS AT AN ADJACENT AIRPLANE.

FLOWS

1. Brakes - Hold
2. Ignition Switch - turn to start, release when engine begins to fire.
3. Throttle - Adjust RPM to 1000
4. Engine instruments - Oil pressure should indicate at least 25 PSI and be rising.
5. Ammeter - Verify charging
6. Annunciators - Review displays for any abnormal warning, caution, or advisory indications. Ensure the standby battery is sufficiently charged on the GI 275 ADI and HSI per the Limitations Section
7. Mixture - Lean one inch for taxi
8. Flaps - Set flaps to the up position or 10 for soft field takeoff
9. Avionics Switch - On
10. Establish crew and passenger communications.

CHECKLISTS

ITEM	SINGLE PILOT RESPONSE	PM RESPONSE	PF RESPONSE
	"After Start Checklist"		
ENGINE INSTRUMENTS	"CHECKED"	"CHECKED"	-
AMMETER	"CHECKED"	"CHECKED"	-
ANNUNCIATORS	"CHECKED"	"CHECKED"	-
MIXTURE	"LEANED"	"LEANED"	-
	"After Start Checklist complete"		

BEFORE TAXI

TASKS	31
DEPARTURE BRIEFING	31
FLIGHT PLAN	32
FLIGHT INSTRUMENTS	32
COMS / NAVS	33
FLOWS	33
CHECKLISTS	33

BEFORE TAXI

TASKS

DEPARTURE BRIEFING

Copy the ATIS / ASOS in preparation for the departure briefing.

The Departure Briefing should have the following information:

Weather

Brief the current weather, any associated hazards and implications on flight. Key items include wind, visibility, clouds, altimeter setting and low level wind shear.

Departure Procedures

Starting at the aircrafts present location, brief taxi route, hot spots, takeoff distance, runway lengths, emergency procedures on departure, and departure procedures.

NOTAMS

Review any NOTAMS effecting the departure.

Threats

Brief the greatest threats to the departure. Examples include, IFR conditions, CFIT, traffic congestion, LLWS and unfamiliar or complex procedures. Discuss ways to mitigate the threats.

Distractions to the pilot should also be considered. Distractions focus primarily on the pilot and human factors such as passengers and doing a sunset flight or tour.

Example: *“Information BRAVO is current, Skies are clear, altimeter is 29.92 and there is a five knot crosswind from the left. We are at transient parking, we will taxi via HOTEL and ALPHA to runway 28R using caution for hotspot three. 28R is 4,598 feet long with a displaced threshold. We require 1,200 feet for takeoff. If there are any critical abnormalities, caution or warning messages on takeoff roll we will abort, stop the aircraft and assess the situation. Clearing the runway if possible. After takeoff, if there is an engine failure or fire we will do the appropriate memory item, followed by the checklist and plan to land off field. We are departing straight out to 3,500 feet. Our greatest on departure is traffic congestion in the pattern and incoming traffic from the coast. We will mitigate the threats by keeping our eyes outside and scanning for traffic.”*

FLIGHT PLAN

The PF should build the flight plan in the GPS. If a clearance is associated with the departure procedures ensure that the procedure is built in the navigation system. After entering the appropriate waypoints the PF should verify the route on the map page. This will ensure there are no erroneous fixes entered. The PM or Instructor will verify the fixes.

The PF should build the VNAV profile by entering the cruise altitude after the top of climb and entering pattern altitude 1NM prior to the destination airport, for descent planning. For IFR flights the departure, arrival and approach procedures will contain VNAV information. The PF should enter the cruising altitude and verify the VNAV restorations match with a current instrument procedure chart.

The PF should also verify all LRUs are operational for every flight. For IFR flights the PF should ensure WAAS, RAIM or EPU will be available depending on the type of operations being conducted.

Once the flight plan has been built and verified the PF should bug the flight instruments in accordance with the departure plan. This should include heading, airspeed and altitude.

FLIGHT INSTRUMENTS

Magnetic Compass - Ensure that the compass is visible and the case is full of fluid.

Airspeed - Should indicate zero with no head wind and match the ADI.

GI 275 ADI - Ensure the altimeter is set and within 75 feet of field elevations. Verify that attitude, heading, altitude, and airspeed are displayed normally on the ADI

Set Synthetic Vision as desired.

Verify that no yellow or red battery icon is displayed on the ADI. If a yellow icon is present, verify the battery's remaining capacity via SOP procedures.

Altimeter - Set the current altimeter setting and verify it is within 75 feet of airport elevation. This should be within 100 feet of the GI 275 ADI.

Turn Coordinator - Wings level, ball centered with no DC flag. The operation of the gyro can be checked on taxi.

GI 275 HSI - Choose the appropriate CDI source for navigation. If desired, select the map mode and set the range for taxi. Check for any advisory messages.

For IFR aircraft, verify that no yellow or red battery icon is displayed on the primary or standby ADI. If a yellow icon is present, verify the battery's remaining capacity is more than 30 minutes.

VSI - Should indicate zero. If note zero, not the zero point.

COMS / NAVS

COM 1 should be used to communicate with ATC for any instructions (Clearance, Ground, Tower, Approach, etc.) COM 2 should be used for advisory communications only (ATIS, ASOS, FBO, etc.)

Set the next frequency to be used in the Active portion of the radio and the next to be used in standby.

COM 1 Active - Ground / Standby - Tower
COM 2 Active - Guard 121.5 / Standby - Arrival ATIS

NAV should be set in the order of use for departure to include active and standby.

When making changes to COMs or NAVs, think ahead and enter the next appropriate frequency in the standby position when available.

FLOWS

NOT APPLICABLE

CHECKLISTS

ITEM	SINGLE PILOT RESPONSE	PM RESPONSE	PF RESPONSE
	"Before Taxi Checklist"		
DEPARTURE BRIEFING	"COMPLETE"	"COMPLETE"	-
FLIGHT INSTRUMENTS	"CHECKED"	"CHECKED"	-
ALTIMETER	"__ . __"	"__ . __"	"SET"
COMS / NAVS	"SET"	"SET"	
	"Before Taxi Checklist complete"		

TAXI

The PF will taxi the airplane with no other duties or distractions while the aircraft is moving. During single pilot or training operations, the PF should stop the aircraft before going heads down for any reason. It is permissible for the PM to perform tasks while the PF is taxiing such as programming radios or navigation.

The PF should prioritize flight path management on the ground over checklists. The aircraft should be stopped or in a low area of vulnerability if the PF is to conduct checklists single pilot.

Perform a brake check before beginning taxi.

Instrument Flight Deck Check

OVERVIEW

Check the flight instruments and systems to verify the aircraft is suitable for IFR flight.

OBJECTIVE

The pilot demonstrates satisfactory knowledge, risk management, and skills associated with conducting a preflight check on the airplane's instruments necessary for an IFR flight.

PROCEDURE

1. Verify the flight instruments, COMs and NAVs per Before Taxi Tasks.
2. Verify that the Magnetic Compass, HSI and turn coordinator move freely during taxi turns.
3. Verify the Magnetic Compass compared to a known heading. This is typically done aligning on the runway during the heading check.

COMMON ERRORS

Operating with inoperative equipment.
Operating with outdated navigation publications or databases.

COMPLETION STANDARDS

Perform preflight inspection by following the SOP procedures and determine that the airplane is in a condition for safe instrument flight.

BEFORE TAKEOFF

TASKS	36
Bugs	36
FLOWS	37
CHECKLISTS	38

BEFORE TAKEOFF

TASKS

The Before Takeoff Checklist is divided into two portions. Before Takeoff Checklist above the line and Before Takeoff Checklist below the line. The line segments the engine runup from pre-departure procedures. The Before Takeoff Checklist above the line references the runup which is associated with the Before Takeoff Flow. The above the line portion and run-up only need to be completed prior to the first takeoff of the flight. Subsequent departures or pattern work only require the below the line portion on the checklist. When complex departures are not being complied with the PF may choose to complete all tasks and flows and complete the before takeoff checklist in its entirety.

Turnoff the taxi light when parked to indicate to surrounding aircraft that you have no intention of movement.

For engine run-up, position the aircraft into the wind if possible. This will provide maximum engine cooling while parked.

Monitor tower frequency or CTAF in the runup area or approaching the hold short lines. Tune the next frequency to be used in the standby position.

Verify the flight instruments have no red x's, no flags and are configured for departure. This includes: airspeed bug, altitude bug, heading bug, CDI setting.

Verify that the MAG/TRUE navigation angle selection on the GI 275 and any interfaced navigators match.

Ensure NAV frequencies are tuned, active and standby, and the GPS is programmed accordingly.

The transponder should be set to VFR, appropriate discrete code as assigned by ATC or issued in an IFR clearance.

Flaps should be confirmed or set for the appropriate takeoff configuration.

Doors must be closed during runup and takeoff. It is permissible to have the windows open for runup and takeoff.

If departing into IMC conditions, turn the pitot heat on before takeoff.

Bugs

The flight instrument bugs should be set for departure.

Airspeed bug - Set for the appropriate climb speed

Altitude bug - Set for level off altitude

Heading bug - Set for the departure runway

FLOWS

1. Brakes - Hold
2. Flight Control Check - perform a box check to make sure no items in the cockpit are inhibiting the flight controls. Note iPad and kneeboard position.
3. Fuel Selector - Both
4. Trim - Set to the takeoff indication
5. Mixture - Rich
6. Throttle - 1700 RPM
7. Mixture - Adjust for density altitude above 3,000 to achieve peak RPM.
8. Magneto Check - Turn the ignition key to the R portion (2 clicks) and verify a drop in RPM of no more than 125. Return the key to BOTH. Turn the ignition key to the L portion (1 clicks) and verify a drop in RPM of no more than 125. The maxi difference should be 75 RPM. Verify the key is back in the BOTH position.

NOTE

A rough running engine during a magneto check indicates led build up and deposits on the spark plugs. This is most often caused by insufficient leaning during taxi. In some instances the magnetos can fail. This is often indicated by the engine dying during the magneto check or excessive drops of 500 RPM or more. To resolve fouled spark plugs, lean the mixture for peak RMP and increase the throttle to full power for one minute. After this procedure attempt a magneto check again. If it fails again return to parking and call maintenance.

9. Ammeter - Check alternator is charging. You can increase the load by turning on lights and pitot heat to verify the alternators ability to charge.
10. Oil Pressure - Green
11. Oil Temperature - Green
12. Annunciators - Review displays for any abnormal warning, caution, or advisory indications.
13. Carburetor Heat Check - Apply carburetor heat and note a drop in RPM. Leave the Carburetor heat applied for Idle check.
14. Throttle - Full idle, verify the engine continues to run above 600 RPM. Close the carburetor heat.

CHECKLISTS

ITEM	SINGLE PILOT RESPONSE	PM RESPONSE	PF RESPONSE
	“Before Takeoff Checklist To the Line”		
FLIGHT CONTROLS	“CHECKED”	“CHECKED”	–
FUEL SELECTOR	“BOTH”	“BOTH”	–
TRIM	“TAKEOFF”	“TAKEOFF”	–
RUNUP	“COMPLETE”	“COMPLETE”	–
MIXTURE	“SET”	“SET”	–
	“Before Takeoff Checklist To the Line complete”		
	“Before Takeoff Checklist Below The Line”		
BUGS	“AIRSPEED ____ KNOTS, ALTITUDE ____ FEET, HEADING BUG SET FOR RUNWAY ____, NO FLAGS”	“SET”	“AIRSPEED ____ KNOTS, ALTITUDE ____ FEET, HEADING BUG SET FOR RUNWAY ____, NO FLAGS” >>INSTRUCTOR ONLY “SET”
COMS / NAVS	“SET”	“SET”	–
TANSPONDER	“SET”	“SET”	–
MIXTURE	“TAKEOFF”	“TAKEOFF”	–
PF/PM FLAPS	“UP” or “10°”	“UP” or “10°”	“CONFIRMED”
ANNUNCIATORS	“CHECKED”	“CHECKED”	–
ENGINE INSTRUMENTS	“CHECKED”	“CHECKED”	–
AMMETER	“CHECKED”	“CHECKED”	–
DOORS / WINDOWS	“CLOSED”	“CLOSED”	–
	“Before Takeoff Checklist Below the Line Complete”		



TAKEOFF

TASKS	40
FLows	40
CHECKLISTS	40

TAKEOFF

TASKS

Verify the correct runway with a runway sign or marking. Both pilots will confirm the correct runway. One pilot will confirm the runway by making a radio call to include the planned runway. The pilot that does not make the radio call confirms the runway by stating:

“Runway _____ confirmed.”

Once aligned with the runway verify the heading bug is set for the departure runway.

PF: “Heading checked.”

PM: “Checked.”

FLOWS

Prior to crossing the runway threshold:

1. Lights - Set (All lights are on)
2. Mixture - Takeoff
3. Transponder - Altitude mode

CHECKLISTS

Not Applicable

CLIMB

TASKS	42
Flap Retraction	42
Leaning	42
Lights	42
FLOWS	42
CHECKLISTS	43



CLIMB

TASKS

Flap Retraction

Flap retraction should be done at a safe altitude, at or above V_y . A safe altitude is 500 - 1,000 ft AGL. Below 500 ft AGL the pilot should be prepared for engine failure. Leaving the flaps extended above 1,000 ft could hinder climb performance.

Leaning

The mixture should be leaned above 3,000 MSL. Leaning technique for the climb provides a rough estimate before the fuel can be leaned precisely in cruise. At 3,000 MSL lean the mixture one inch travel or three rotations. Continue leaning one rotation per 1,000 ft

Lights

Leave all light on when climbing in busy areas with high traffic volume, to aid in collision avoidance. Otherwise, the Taxi and Landing lights can be turned off. The Strobe, Nav, and Rotating Beacon are required.

Pitot Heat should be used while in visible moisture.

FLOWS

AT 3,000 MSL

1. Mixture - Lean three rotations
2. Lights - Taxi and landing light off or leave on in congested airspace.
3. Pitot Heat - On in visible moisture.

CHECKLISTS

ITEM	SINGLE PILOT RESPONSE	PM RESPONSE	PF RESPONSE
	“Climb Checklist”		
FLAPS	“UP”	“UP”	“CONFIRMED”
MIXTURE	“LEANED”	“LEANED”	–
LIGHTS	“SET”	“SET”	–
PITOT HEAT	“SET”	“SET”	–
	“Climb Checklist complete”		

CRUISE

TASKS	45
Cruise Power & Leaning	45
FLOWS	45
CHECKLISTS	45



CRUISE

TASKS

Cruise Power & Leaning

Cruise leaning procedures should be in accordance with the POH using the performance data in Section 5.

Without EGT or CHT indicators, we can suggest using RMP as an indication.

Set the appropriate power setting from the POH. Slowly lean the mixture until there is a slight drop in cruise RPM. Increase the mixture three turns after the drop in RPM. This will result in a rich of peak lean.

At the top of climb the fuel should be compared to the anticipated or planned fuel. Balance the fuel tanks if necessary.

It is recommended to monitor fuel flow on 121.5 while in cruise flight.

FLOWS

1. Power - Verify cruise power is being produced within the planned parameters.
2. Lights - For high traffic volume areas leave all lights on. Otherwise, turn off the taxi and landing light.

CHECKLISTS

ITEM	SINGLE PILOT RESPONSE	PM RESPONSE	PF RESPONSE
	"Cruise Checklist"		
POWER	"SET"	"SET"	-
MIXTURE	"LEANED"	"LEANED"	-
LIGHTS	"SET"	"SET"	-
	"Cruise Checklist complete"		

UPSET RECOVERY

OVERVIEW

Loss of Control In-flight is the leading cause of fatalities in modern aviation. The objective is to train pilots to be proficient at upset identification and simply recovery.

An upset is:

1. Any flight condition not usually experienced in normal or training operations
2. Pitch greater than 25° nose up
3. Pitch greater than 10° nose down
4. Bank angle greater than 60°
5. Inappropriate airspeed
6. Approaching stall

PROCEDURE

1. PF **"UPSET"**
2. Push
3. Roll
4. Thrust
5. Stabilize

Step One - Recognize

Situational Awareness before recovery

Cross check flight instruments to confirm

Call out "UPSET"

Assess the energy state of the aircraft

Initiating the recovery is the primary objection - not troubleshooting why the upset occurred

Step Two - Push

Unload the aircraft

Apply smooth and deliberate controls

Reduce AOA

Maintain until the stall has been broken

Don't push too much - about 0.5g "light in the seat"

Step Three - Roll

After stall has been recovered from

Roll to wings level without adding elevator

Remain unloaded until the roll is complete

If the elevator is ineffective roll the plane to induce nose down pitch

Step Four - Thrust

Use thrust as required - Can be dynamic during the recovery

Full throttle may be necessary for recovery

Adding thrust will cause a pitch up moment

Step Five - Stabilize

Return to a normal flight path and configuration

Use TEAM model

COMMON ERRORS

Failure to seek assistance or declare an emergency in a deteriorating situation.

Distractions, loss of situational awareness, or improper task management.

Failure to interpret flight instruments.

Failure to unload the wings in recovering from high G situations.

Exceeding the operating envelope during the recovery.

COMPLETION STANDARDS

Use proper instrument cross-check and interpretation to identify an unusual attitude (including both nose-high and nose-low), and apply the appropriate pitch, bank, and power corrections, in the correct sequence, to return to a stabilized level flight attitude.

LOSS OF RELIABLE AIRSPEED**OVERVIEW**

Loss of reliable airspeed can be very difficult to detect. Delay in detection will result in pilot induced loss of control in-flight. The airspeed indicator is malfunctioning due to instrument icing, blocking or system malfunction.

The GI 275 ADI will indicate yellow IAS miscompare or magenta ground indication if the ADC fails.

It is imperative that the pilot be familiar with control-performance methods.

Performance	Pitch	Bank	Power
Straight & Level 80 KIAS	4° UP	0°	2200 RPM
Straight & Level 90 KIAS	2° UP	0°	2400 RPM
Straight & Level 100 KIAS	2° UP	0°	2600 RPM
Vy Climb	5° UP	0°	Max
Vx Climb	7° UP	0°	Max
Descent 90 KIAS	0°	0°	2000 RPM

PROCEDURE

1. Remove the erroneous airspeed from the instrument scan
2. Reference standby or groundspeed indications
3. Declare an emergency with ATC if in IMC
4. Maintain VMC if possible

COMMON ERRORS

Failure to maintain airplane control.

Distractions, loss of situational awareness, or improper task management.

COMPLETION STANDARDS

Demonstrate CRM/SRM and aircraft control.

MANEUVERS

Pre-Maneuver Flow	49
Steep Turns	50
LOW SPEED MANEUVERS	
Slow Flight	51
Power-Off Stalls	52
Power-On Stalls	53

MANEUVERS

Pre-Maneuver Flow

OVERVIEW

The Pre-Maneuver Flow should be done prior to each maneuver conducted. Use the CARE acronym to complete this task.

OBJECTIVE

The objective is to stabilize the aircraft in a safe environment appropriate to the maneuver being conducted.

PROCEDURE

1. **Clearing Turns**
 1. Look for traffic under the raised wing
 2. Two 90° turns in opposite directions
 3. One 180° turn
2. **Attitude**
 1. Ensure you are at the proper altitude and airspeed for the maneuver
 2. Note your altitude, airspeed and heading for the maneuver
3. **Radio Call**
 1. Announce your intentions for maneuvering on the appropriate frequency (122.75)
 2. Include tail number, locations, altitude and intentions.
4. **Emergency Landing**
 1. Brief emergency landing scenarios in the event of an engine failure.
 2. Determine the best location for an emergency landing.

COMMON ERRORS

Failure to complete the pre-maneuver flow prior to each maneuver.

Failure to divide attention and scan for traffic.

Failure to complete two 90° turns or a 180° turn

COMPLETION STANDARDS

The student successfully manages the flight path while performing the tasks of this maneuver.

Steep Turns

OVERVIEW

The airplane is turned using a constant angle of bank (45° for Private, 50° for Commercial) while maintaining a constant altitude and airspeed. Rollout should be to a predetermined heading.

OBJECTIVE

To teach the student to turn the airplane at steep angles of bank while maintaining altitude and controlling overbanking tendencies, simultaneously dividing attention inside and outside the cockpit.

PROCEDURE

1. Complete the Pre-Maneuver Flow
2. Configure at 90 KIAS and no less than 1,500 feet AGL
3. Choose a visual reference point to begin on and roll out of the steep turn on.
4. Roll the plane left or right as desired to 45° (PVT) or 50° (COM) degrees of bank with coordination of rudder and aileron.
5. Rolling through 30° degrees of bank add 100RPM and back pressure on the elevator to counter the loss of vertical lift during the maneuver.
6. Maintain altitude, airspeed and bank angle with coordinated use of the flight controls.
7. Adjust power as required.
8. Plan to roll out on the desire visual reference point.
9. Use 1/2 your bank angle to lead the roll out.
10. Remove any power, trim or back pressure applied during the maneuver.

Private minimum of one 360° turn as directed by the instructor

Commercial complete one 360° turn followed immediately by the opposite direction turn.

COMMON ERRORS

Failure to divide attention between airplane control and orientation.

Collision hazards, to include aircraft and terrain.

Low altitude maneuvering including stall, spin, or CFIT.

Distractions, improper task management, loss of situational awareness, or disorientation.

Failure to maintain coordinated flight.

COMPLETION STANDARDS

PA.V.A.S5 Maintain the entry altitude ± 100 feet, airspeed ± 10 knots, bank $\pm 5^\circ$, and roll out on the entry heading $\pm 10^\circ$.

CA.V.A.S5 Maintain the entry altitude ± 100 feet, airspeed ± 10 knots, bank $\pm 5^\circ$, and roll out on the entry heading $\pm 10^\circ$.

LOW SPEED MANEUVERS

Slow Flight

OVERVIEW

After clearing turns are completed the airplane is maneuvered at an airspeed approximately 10 knots above the stall speed for the specified configuration at which the stall horn does not sound. The maneuver should be accomplished in straight flight, turns up to 30° of bank, climbs and descents using various configurations.

OBJECTIVE

To teach the student to recognize changes in airplane flight characteristics and control effectiveness at critically slow airspeeds in various configurations while maintaining positive airplane control at all times.

Altitude for this maneuver must be above 1,500' AGL.

PROCEDURE

1. Complete the Pre-Maneuver Flow
2. Apply carburetor heat and set 1700 RPM
3. Extend flaps on schedule to 30°
4. Maintain heading and altitude while slowing to an airspeed approximately 10 kts above stall speed for the specified configuration.
5. Add power to 2200 RPM to maintain airspeed 10 KTS above stall speed. The stall warning horn should not sound during this maneuver.
6. Perform climbing, descending and turning flight as directed by the instructor.
7. Recover by applying max power and adjusting pitch to maintain altitude while accelerating
8. Retract the flaps on schedule
9. Resume normal cruise

COMMON ERRORS

Inadvertent slow flight and flight with a stall warning, which could lead to loss of control.

Failure to maintain coordinated flight.

Distractions, loss of situational awareness, or improper task management.

Failure to establish specified configuration.

Improper entry technique.

Failure to establish and maintain the specified airspeed.

Excessive variations of altitude and heading when a constant altitude and heading are specified.

Uncoordinated use of flight controls.

Improper correction for torque effect.

Improper trim technique.

Unintentional stalls.

Inappropriate removal of hand from throttles.

COMPLETION STANDARDS

PA.VII.A.S5 Maintain the specified altitude, ± 100 feet; specified heading, $\pm 10^\circ$; airspeed, $+10/-0$ knots; and specified angle of bank, $\pm 10^\circ$.

CA.VII.A.S5 Maintain the specified altitude, ± 50 feet; specified heading, $\pm 10^\circ$; airspeed, $+5/-0$ knots; and specified angle of bank, $\pm 5^\circ$

Power-Off Stalls

OVERVIEW

The

OBJECTIVE

To

PROCEDURE

1. Complete the Pre-Maneuver Flow
- 2.

COMMON ERRORS

PA.V.A.R1

COMPLETION STANDARDS

PA.V.A.S5 Maintain

Power-On Stalls

OVERVIEW

The

OBJECTIVE

To

PROCEDURE

1. Complete the Pre-Maneuver Flow
- 2.

COMMON ERRORS

PA.V.A.R1

COMPLETION STANDARDS

PA.V.A.S5 Maintain

DESCENT

TASKS	55
Weather	55
Flight Plan	55
COMS / NAVS	55
Arrival Briefing	55
FLOWS	56
CHECKLISTS	57

DESCENT

TASKS

Weather

Copy the appropriate weather for the destination airport.

Flight Plan

Once copying the weather you can anticipate the landing runway and procedures. Update the GPS flight plan with any changes to approach and arrival procedures.

COMS / NAVS

COM 1 should be used to communicate with ATC for any instructions (Clearance, Ground, Tower, Approach, etc.) COM 2 should be used for advisory communications only (ATIS, ASOS, FBO, etc.)

Set the next frequency to be used in the Active portion of the radio and the next to be used in standby.

*COM 1 Active - Tower / Standby - Ground
COM 2 Active - Arrival ATIS / Standby - FBO if needed*

NAV should be set in the order of use for arrival to include active and standby.

When making changes to COMs or NAVs, think ahead and enter the next appropriate frequency in the standby position when available.

Arrival Briefing

An arrival **WANT** briefing should be completed prior to beginning the initial decent.

Weather

Review the weather information identifying any threats. Set the current altimeter setting.

Arrival Procedures

From your current position, brief the arrival until the aircraft is parked. This includes: decent/arrival procedures, approach procedures, traffic pattern procedures, missed approach or go-around procedures, landing runway information, taxi routing, and parking.

NOTAMS

Review any NOTAMS effecting the departure.

Threats

Brief the greatest threats to the arrival. Examples include, IFR conditions, CFIT, traffic congestion, LLWS and unfamiliar or complex procedures. Discuss ways to mitigate the threats.

VFR Example: "Information Whiskey is current, wind is 180 at 10 knots, which is a strong left crosswind for runway 28L. Skies are clear and the altimeter is 30.07. Currently, we are 3,500 over Torrey Pines, we will contact tower and request touch and goes, then follow tower's instructions inbound. Most likely this will be south of Mount Soledad to join the left traffic pattern at 1,400ft. It will be a short field landing on 28L that has 4,589 feet of available runway. If we have to go around it will be full power flaps to 20. After landing we will continue in the pattern. The only NOTAM is 28R is closed. High volume of VFR is the largest threat. We will mitigate this by looking outside and using proper scanning techniques."

IFR Example: "Information Charlie..."

FLOWS

1. Fuel Selector - Both
2. Mixture - Enrich the mixture one turn per 1,000 feet of decent. Set the mixture full rich below 3,000 feet. If landing above 3,000 feet, enrich the mixture one turn per 1,000 feet until reaching traffic pattern altitude.
3. Lights - All lights on for decent and landing.
4. Seatbelts - Checked on for landing.

CHECKLISTS

ITEM	SINGLE PILOT RESPONSE	PM RESPONSE	PF RESPONSE
	“Descent Checklist”		
APPROACH BRIEFING	“COMPLETE”	“COMPLETE”	–
FUEL SELECTOR	“BOTH”	“BOTH”	–
MIXTURE	“SET”	“SET”	–
LIGHTS	“SET”	“SET”	
COMS / NAVS	“SET”	“SET”	
ALTIMETER	“__ . __”	“__ . __”	“SET”
SEAT-BELTS	“CHECKED”	“CHECKED”	“CHECKED”
	“Descent Checklist complete”		

LANDINGS

Normal and Crosswind Landing	59
Short Field Landing	59
Soft Field Landing	59
Power-Off 180 Landing	59
Instrument Landing	59
Missed Approach	59
Go-Around	60
Aborted / Bounced Landing	61

LANDINGS

Normal and Crosswind Landing

Short Field Landing

Soft Field Landing

Power-Off 180 Landing

Instrument Landing

Missed Approach

Go-Around

Initiating a Go-Around

A Go-Around should be initiated any time at the discretion of the pilot flying (PF). Conditions that should automatically initiate a go-around include:

1. Unstable approach
2. Low-level Wind Shear (LLWS)
3. Traffic on the runway within 3,000 feet of the aircraft
4. ATC request
5. Collision hazard with aircraft, terrain, obstacles, wires, vehicles, vessels, persons, or wildlife

OVERVIEW

The landing approach is abandoned and the airplane is transitioned to a climb.

OBJECTIVE

To develop the student's ability to correctly perform the go-around/rejected landing procedure.

PROCEDURE

The pilot flying initiates the go-around by making the standard call out, adding full power and being the flap retraction sequence.

1. PF **"Go-around, flaps 20"**
2. Add full power
3. Retract flaps to the 20° position
4. Pitch for the horizon to level off and begin accelerating
5. Once there is a trend reversal on the VSI, retract flaps to 10° position
6. Radio intentions to ATC
7. Accelerating through V_Y , retract flaps to 0° / UP position
8. Above 1,000' AGL complete the *climb checklist*

COMMON ERRORS

Delayed recognition of the need for a go-around/rejected landing. Delayed performance of a go-around at low altitude.

Improper application of power.

Improper airplane configuration.

Collision hazards, to include aircraft, terrain, obstacles, wires, vehicles, vessels, persons, and wildlife.

Low altitude maneuvering including stall, spin, or CFIT.

Distractions, loss of situational awareness, or improper task management.

COMPLETION STANDARDS

PA.IV.N.S4 Apply takeoff power immediately and transition to climb pitch attitude for V_X or V_Y as appropriate $\pm 10/-5$ knots.

PA.IV.N.S7 Maintain $V_Y + 10/-5$ knots to a safe maneuvering altitude.

CA.IV.N.S4 Apply takeoff power immediately and transition to climb pitch attitude for V_X or V_Y as appropriate ± 5 knots.

CA.IV.N.S7 Maintain $V_Y \pm 5$ knots to a safe maneuvering altitude.

Aborted / Bounced Landing

OVERVIEW

An aborted or bounced landing can occur for a variety of reasons:

1. Wind shear
2. Low-level turbulence
3. Excessive rate of descent
4. Excessive airspeed
5. Power not at idle during touchdown
6. Incorrect flare technique

OBJECTIVE

To develop the student's ability to correctly recover from an aborted or bounced landing.

PROCEDURE

Light Bounce Recovery Procedures

1. Maintain or reestablish landing attitude
2. Use power as required to soften the subsequent touchdown
3. Beware of increased landing distance

Increasing pitch attitude can lead to a tail strike

Severe Bounce Recovery Procedures

1. Do not attempt to land
2. Advance throttle to max power
3. Maintain pitch attitude until you begin to accelerate in airspeed and have a positive VSI trend
4. Trim
5. Follow normal go-around procedures

COMMON ERRORS

Tail strike from increasing pitch after a bounced landing

Delayed recognition of the need for a go-around/aborted landing.

Improper application of power.

Improper airplane configuration.

Collision hazards, to include aircraft, terrain, obstacles, wires, vehicles, vessels, persons, and wildlife.

Low altitude maneuvering including stall, spin, or CFIT.

Distractions, loss of situational awareness, or improper task management.

COMPLETION STANDARDS

PA.IV.N.S4 Apply takeoff power immediately and transition to climb pitch attitude for V_X or V_Y as appropriate $\pm 10/-5$ knots.

PA.IV.N.S7 Maintain $V_Y \pm 10/-5$ knots to a safe maneuvering altitude.

CA.IV.N.S4 Apply takeoff power immediately and transition to climb pitch attitude for V_X or V_Y as appropriate ± 5 knots.

CA.IV.N.S7 Maintain $V_Y \pm 5$ knots to a safe maneuvering altitude.

AFTER LANDING

TASKS	63
Flaps	63
FLOWS	63
CHECKLISTS	63



AFTER LANDING

TASKS

In an effort to not block runway exits, first get a taxi clearance from ground control. When there is a moment of reduced work load or the aircraft is stopped complete the tasks, flows and checklist.

In CRM situations the PF should continue taxing while the PM completes the after landing items.

Flaps

During normal operations, when returning to parking set the flaps to 0. If there is a plan to taxi back to the runway for traffic patter work and the planned departure requires flaps 10, set them accordingly.

The flaps may already be up after completing a short field landing.

FLOWS

Single pilot or PM performs the after landing flow.

1. Trim - Set to Takeoff
2. Mixture - Leaned one inch for ground operations.
3. Carburetor Heat - Off
4. Lights - Landing and strobe off. Taxi, Nav, and rotating beacon remain on.

CHECKLISTS

ITEM	SINGLE PILOT RESPONSE	PM RESPONSE	PF RESPONSE
	The After Landing Checklist is verified silently.		
	"After landing checklist complete"	"After landing checklist complete"	

SHUTDOWN / SECURE

TASKS	65
Securing the Aircraft	65
Post Flight	65
FLOWS	65
CHECKLISTS	65



SHUTDOWN / SECURE

TASKS

Securing the Aircraft

Tie or chain the aircraft and chock at least one wheel.

Post Flight

The post flight inspection should be completed in a similar fashion to the preflight inspection. The primary focus is to detect any damage that happened during the flight, for example looking for indications of a bird strike.

In the event of another crew taking over the the aircraft, the next crew's pre flight can substitute for the post flight on the incoming crew.

Any discrepancies should be written up and reported to maintenance.

Record the hobbs and tach in the flight log.

FLOWS

1. Avionics Switch - Off
2. Magneto Grounding - Check by turning the ignition switch to the **OFF** position momentarily and then back to **BOTH**. If the engine dies, do not attempt to restart.
3. Throttle - Advance to 1200 RPM and immediately move the mixture to idle cut off.
4. Electrical Switches - All light and pitot heat off. The NAV light may be required for repositioning an aircraft at night.
5. Master Switch - Off
6. Ignition Switch - Off
7. Fuel Selector - LEFT or RIGHT

CHECKLISTS

ITEM	SINGLE PILOT RESPONSE	PM RESPONSE	PF RESPONSE
	The Shutdown / Secure Checklist is verified silently.		

APPENDIX I - MANEUVERS INDEX

Aeronautical Decision Making	6
No Time Threats	8
Errors	9
MAINTENANCE STATUS	21
PASSENGER BRIEFING	21
CREW BRIEFING	22
AIRWORTHINESS ACCEPTANCE	22
PREFLIGHT	23
DEPARTURE BRIEFING	31
FLIGHT PLAN	32
FLIGHT INSTRUMENTS	32
COMS / NAVS	33
Instrument Flight Deck Check	34
Bugs	36
Flap Retraction	42
Leaning	42
Lights	42
Cruise Power & Leaning	45
Pre-Maneuver Flow	49
Steep Turns	50
Slow Flight	51
Power-Off Stalls	52
Power-On Stalls	53
Weather	55
Flight Plan	55
COMS / NAVS	55
Arrival Briefing	55
Go-Around	60

Flaps	63
Securing the Aircraft	65
Post Flight	65

