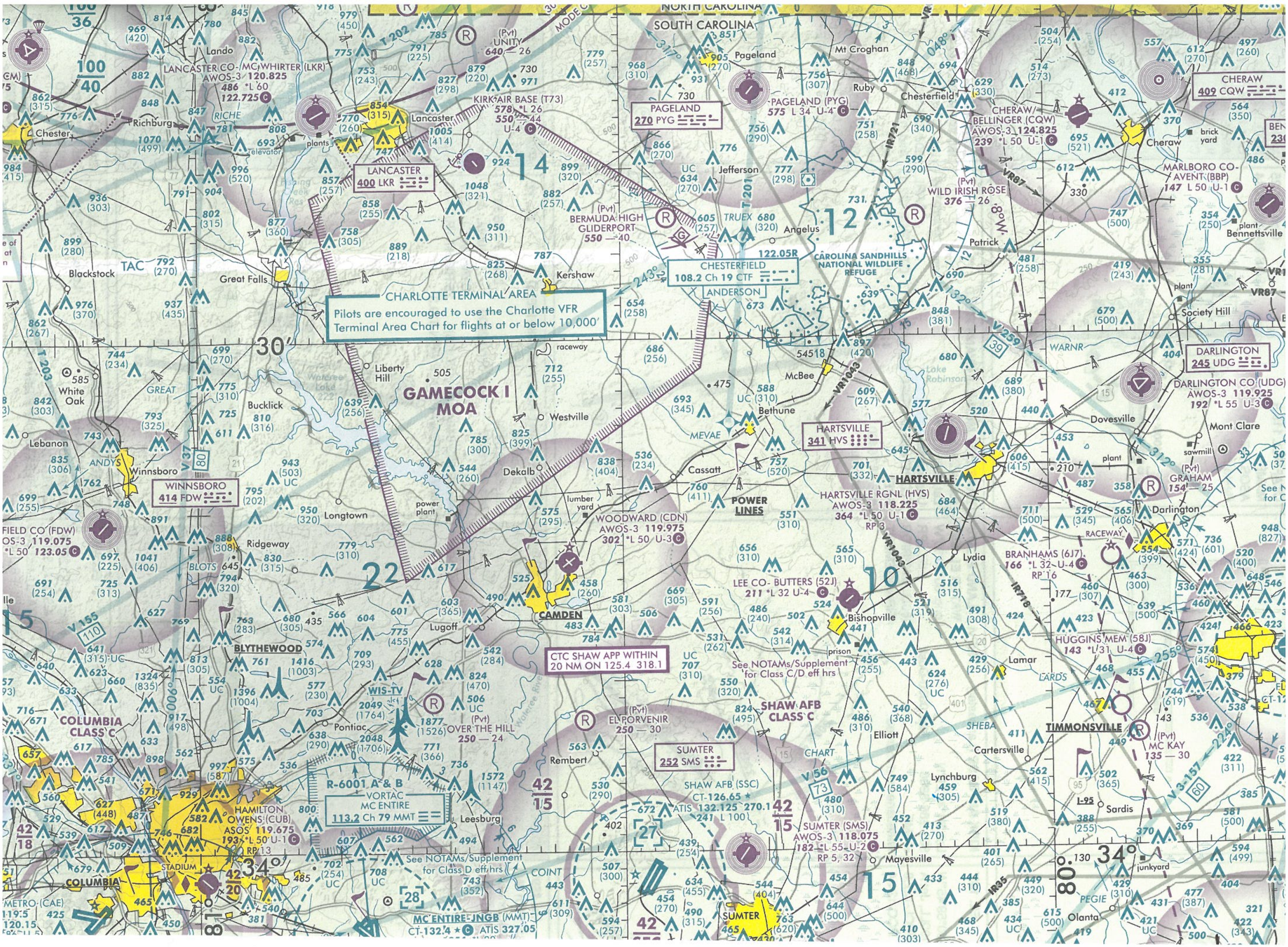


Course Syllabus, Curriculum, and Handbook

Colonel Roland Butler National Flight Academy - Powered Civil Air Patrol

South Carolina Just right.



NORTH CAROLINA
SOUTH CAROLINA
LANCASTER CO-MC WHIRTER (LKR)
AWOS-3 120.825
KIRK AIR BASE (T73)
LANCASTER
400 LKR
PAGELAND
270 PYG
PAGELAND (PYG)
CHERAW/BELLINGER (CQW)
AWOS-3 124.825
CHERAW
409 CQW
MARLBORO CO-AVENT (BBP)
WILD IRISH ROSE
BERMUDA HIGH GLIDERPORT
CHESTERFIELD
108.2 Ch 19 CTF
ANDERSON
122.05R
CAROLINA SANDHILLS NATIONAL WILDLIFE REFUGE
CHARLOTTE TERMINAL AREA
Pilots are encouraged to use the Charlotte VFR Terminal Area Chart for flights at or below 10,000'
DARLINGTON
245 UDG
DARLINGTON CO (UDG)
AWOS-3 119.925
GAMECOCK I MOA
HARTSVILLE
341 HVS
HARTSVILLE RGNL (HVS)
AWOS-3 118.225
WINNSBORO
414 FDW
WOODWARD (CDN)
AWOS-3 119.975
POWER LINES
LEE CO- BUTTERS (52J)
BRANHAMS (6J7)
HUGGINS MEM (58J)
CAMDEN
BLYTHEWOOD
CTC SHAW APP WITHIN
20 NM ON 125.4 318.1
See NOTAMs/Supplement for Class C/D eff hrs
SHAW AFB CLASS C
SHAW AFB (SSC)
SUMTER
252 SMS
SUMTER (SMS)
AWOS-3 118.075
EL PORVENIR
OVER THE HILL
WIS-TV
TIMMONSVILLE
MC KAY
COLUMBIA CLASS C
HAMILTON OWENS (CUB)
ASOS 119.675
R-6001 A & B
VORTAC
MC ENTIRE
113.2 Ch 79 MMT
See NOTAMs/Supplement for Class D eff hrs
MC ENTIRE JNGB (MMT)
ATIS 327.05
COLUMBIA
STADIUM
METRO (CAE)
SUMTER
Lancaster
Chester
Richburg
Great Falls
Kershaw
Jefferson
Angelus
Patrick
Chesterfield
Ruby
Mt Croghan
Cheraw
Society Hill
Bennettsville
Blackstock
White Oak
Lebanon
Winnsboro
Ridgeway
Longtown
Liberty Hill
Westville
Bucklick
Dekalb
Cassatt
Bethune
McBee
Lugoff
Pontiac
Leesburg
Rembert
Elliott
Bishopville
Lydia
Dovesville
Mont Clare
Darlington
Lamar
Cartersville
Lynchburg
Mayesville
Sardis
Olanta

CDN - WOODWARD FIELD **CAMDEN - 10**

CHARLOTTE SECTIONAL
10/18/2016

Latitude: 34° 17' 00.9000" N
Longitude: 80° 33' 53.5000" W



Elevation - 302' MSL **Mag Var - 08° W**

Runway						Edge	Approach	Traffic
ID	Length	Width	Surface	VGSI	REILS	Lights	Lights	Pattern
06/24	5000'	100'	ASPH	06/24	06/24	MED		Standard
14/32	2998'	100'	ASPH					Standard

Runway Pavement Strength					Navigation			
Runway	SW	DW	DTW	DDTW	IDENT	Type	FREQ	Direct/Dist
06/24	51.0	70.0	131.0		CTF	VOR/DME	108.20	r216° 26.3 NM to fld
14/32	30.0	55.0	90.0					

Communications				ATC		AWOS/ASOS	
Unicom	CTAF	GCO	RCO	FREQ	FAA ID	FREQ	Phone
123.000	123.000			125.4	SSC	119.975	(803) 424-1979

Manager Barry T. Catoe
GPS 2203 Airline Dr
Address Camden, SC 29020
Phone (803) 425-7238
Fax
E-mail barry.catoe@kershaw.sc.gov

FBO Phone/Fax
Camden Jet Center
(803) 432-3095 (803) 432-1311

Storage HGR,TIE
Landing Fee N
Lighting Sched SEE RMK

Repairs Y
Oxygen Y
Fuel Type 100LL, JET A

Att Schedule MON-FRI 0800-1800 / SAT-SUN 0800-1700

Remarks
MIRL RWY 06/24 PRESET LOW INTST;
INCR MIRL INTST AND ACTVT REIL
RWYS 06 & 24 - CTAF.
AFTR HRS RAMP ACCESS PED GATE
USE VFR SQUAWK CODE.
CAMDEN JET CENTER
AFTR HRS 803-713-4655.
FULL/SELF SERVICE 100LL and JET-A

Student Pilot Worksheet
"Scavenger Hunt"

Airplane Worksheet		Airport Worksheet	
N-Number:		Airport Name: Identifier:	
CAP Call Sign:		Elevation:	
Make & Model:		Traffic Pattern Altitude:	
Gross Weight:		ATIS/AWOS:	
Fuel Capacity:		CTAF:	
Minimum Fuel for Flight:		Runway:	
Fuel Color:		Length:	
Oil Capacity:		Left / Right Traffic:	
Minimum Oil for Flight:		Obstructions:	
Battery Voltage:		Runway:	
Alternator Voltage:		Length:	
Vso:		Left / Right Traffic:	
Vs1:		Obstructions:	
Vr:			
Vx:			
Vy:			
Vfe:			
Va:			
Vno:			
Vne:			
Best Glide Speed:			

C172 GENERIC AIRCRAFT INFORMATION

AIRSPEEDS FOR NORMAL OPERATION

Takeoff, Flaps Up:		
Normal Climb	_____	KIAS
Short Field Takeoff, Flaps 10°, @ 50'	_____	KIAS

Enroute Climb, Flaps Up:		
Normal @ Sea Level	_____	KIAS
Normal @ 10,000' MSL	_____	KIAS
Best Rate of Climb (Vy) @ Sea Level	_____	KIAS
Best Angle of Climb (Vx) @ Sea Level	_____	KIAS

Landing Approach:		
Normal Approach, Flaps Up	_____	KIAS
Normal Approach, Full Flaps	_____	KIAS
Short/Soft Field Approach, Full Flaps	_____	KIAS

Balked Landing:		
Maximum Power, Flaps 20°	_____	KIAS

Maneuvering Speed (VA):		
_____Lbs.	_____	KIAS
_____Lbs.	_____	KIAS
_____Lbs.	_____	KIAS

Maximum Demonstrated Crosswind Velocity:		
Takeoff and Landing	_____	Knots

Colonel Roland Butler Powered Flight Academy
NFA-MAR
Ground School Syllabus

Day	Flight Academy Handbook	Next day Student Homework	Student Deliverables
Saturday 15 July	Meet with CFIs	Pages 1-8	Emergency Procedures (EP) from Checklist
Sunday 16 July	Pre/Post Flight Prep & Procedures Pages 1-8	Pages 9-11; 13-15	Airplane & Airport Work Sheet and EP
Monday 17 July	Airport Operations & Slow Flight & Stalls Pages 9-11; 13-15	Pages 12, 20-31	Work Sheet and EP
Tuesday 18July	Takeoffs & Landings Pages 12, 20-31	Pages 16-20	EP
Wednesday 19 July	Pages 16-20	Aircraft Checklist	EP
Thursday 21 July	Emergency Ops Aircraft Checklist		EP and Pre-Solo Exam
Friday 22 July	Performance; Weight & Balance; Cross Country		

A Short Primer on Aircraft Radio Usage

In general at an airport without a fully functional control tower, your radio calls should follow this generic format: **Who** you are calling, **Who** you are, **Where** you are, **What** you want or are doing, **Who** you are calling.

Traffic: Preface your radio call with the word "**Traffic**", as in **Camden Traffic**, when making a general broadcast in the blind to all other aircraft in the vicinity of Camden, like talking on a party line or in a chat room when the tower is not in operation.

Tower or UNICOM: Preface your radio call with the word "**Tower**" or "**UNICOM**", as appropriate, as in **Blackstone Tower**, when calling an entity on the ground, wishing to establish communication and expecting a reply.

Sample Phraseology for Non-Towered Airport:

Camden Traffic, CAP 2557, taxi Runway XX, Camden

Camden Traffic, CAP 2557, taxiing on Runway XX for departure, Camden

Camden Traffic, CAP 2557, departing Runway XX to the southwest, Camden

Camden Traffic, CAP 2557, clear of the pattern to the southwest, Camden

Camden Traffic, CAP 2557, 10 miles southwest, in bound landing, will enter downwind for Runway XX, Camden

Camden Traffic, CAP 2557, entering downwind, Runway XX, Camden

Camden Traffic, CAP 2557, base, Runway XX, Camden

CamdenTraffic, CAP 2557, final, Runway XX, Camden

CamdenTraffic, CAP 2557, clear of the active and taxiing to parking, Camden

CAP STANDARD 71-1 EXTRACT
1 Oct 2020

Aircrew Training, Airplane

Colonel Roland Butler
National Flight Academy
Mid-Atlantic Region
Camden, South Carolina

NATIONAL HEADQUARTERS CIVIL AIR PATROL
Maxwell Air Force Base, Alabama

OPR: CAP/DO

Powered Flight Academy

The following syllabus is designed to take a Cadet to pre-solo/solo. Ground school materials, flying handbooks, instructional standards, and operations guidance are provided by individual flight academies based on their local environment. The syllabus is structured into eight events; however, progression is based upon achievement of specified "completion levels" as defined below. An event is not considered complete until the specified level of performance has been demonstrated. The Flight Instruction Log the follows the syllabus content provides an easy way to record task accomplishment and completion level.

COMPLETION LEVEL KEY

LEVEL 1	Student is able to participate in the maneuver as it is demonstrated by the flight instructor.
LEVEL 2	Student is able to perform the assigned maneuver with explanation, and minimum assistance from the flight instructor.
LEVEL 3	Student is able to perform the assigned maneuver with a minimum of explanation, and with no assistance from the flight instructor.
LEVEL 4	Student is able to perform the assigned maneuver to the level of competence necessary for safe, solo flight, with no explanation or assistance from the flight instructor.

LESSON 1 - DUAL FLIGHT

The first lesson consists of familiarization with the airplane and its operating procedures, the sensations of flight, local flight areas, and the use of flight controls and instruments. A one-hour round-trip flight to the practice area or nearby airport is effective in stimulating a new student's interest.

OPERATION	COMPLETION LEVEL	COMMENTS
1. Airplane Familiarization • Pre-flight inspection - use checklist • Cockpit familiarization • A/C flight manual • A/C certificates and documents	Level 1	Approx .5 hr this lesson
2. Engine Start • Use of checklist • Safety precautions • Clearing area	Level 1	
3. Radio Operation • Audio panel & switches • Squelch operation	Level 1	
4. Taxiing • Use of throttles & brakes • Control position for windy conditions	Level 1	
5. Pre-takeoff Check • Use checklist	Level 1	
6. Takeoff. Traffic Pattern & Climb out • Area familiarization	Level 1	Stress good traffic scan right from the start.
7. Flight Controls - Four Fundamentals • Control effects & Usage • Stability • Trim • Straight & Level Pitch & bank control	Level 1	Do by visual reference (VR) & instrument reference (IR). Do not use hood, but show all instrument reactions. Demonstrate adverse yaw.

• Turns - medium bank (approx. 30 degrees) • Effects of power (turning tendencies) • Leveling off from climbs & descents • Climbs & descents (straight & turning) • Use of flaps		Correct way first, and then un-coordinated.
8. Traffic Pattern, Approach. Landing & Parking 9. Post-Flight Discussion 10. Preview Next Lesson • Review straight & level, turns, climbs & descents. Introduce steep turns. slow-flight & power-off stalls	Level 1	Stress correct landing attitude on each landing. "Good flight" - ALWAYS! Most students can climb, descend & turn at end of lesson 1.

LESSON 2 - DUAL FLIGHT

At the end of the second lesson, the student should be able to perform the four basic maneuvers (straight & level, turns, climbs, and descents) with minimum assistance and slow-flight and power-off stalls under the direction of the instructor.

OPERATION	COMPLETION LEVEL	COMMENTS
1. Pre-Flight Discussion		Limit all IR training to a time permitting basis.
2. Pre-Flight Inspection	Level 2	
3. Engine Start	Level 2	
4. Radio Operation	Level 2	
5. Taxiing	Level 2	
6. Pre- Takeoff Check	Level 2	
7. Takeoff and Departure • Departure & level off procedures	Level 2	Re-emphasize good traffic scan techniques.
8. Climbing Turns	Level 2	VR & IR to predetermined altitude
9. Straight & Level	Level 2	VR&IR
10. Medium Turns	Level 2	VR&IR
11 Steep Turns	Level 1	Warm-up with 45 degree of bank, then 50 - 60 degrees.
12. Airspeed & Configuration Changes	Level 1	Use this to lead into MCA & stalls.
13 Slow Flight/Minimum Controllable Airspeed (MCA)	Level 1	Without flaps at first, then with different flap settings up to full flaps.
14. Power-Off Stalls	Level 1	Start with recoveries without power, and then show how power reduces the altitude lost.
15. Descents & Gliding Turns	Level 2	
16. Traffic Pattern, Approach, Landing & Parking	Level 2	Stress the correct landing attitude on every landing.
17. Post-Flight Discussion		
18. Preview Next Lesson		

- Review previous maneuvers.
- Introduce approach/landing stalls.

LESSON 3 - DUAL FLIGHT

At the completion of this lesson, the student should perform the four basic flight maneuvers with a reasonable degree of proficiency, and should accomplish slow-flight and power-off stalls with minimum assistance from the instructor. The student should be responsible for pre-flight inspection, starting procedures, radio communication, taxiing, and parking without direction from the instructor, except in unusual or unfamiliar situations.

OPERATION	COMPLETION LEVEL	COMMENTS
1. Preflight Discussion		Limit all IR training to a time permitting basis.
2. Preflight, Starting Engine, & Taxiing	Level 3	
3. Takeoff & Departure	Level 2	
4. Climbs & Climbing Turns	Level 2	
5. Level-off from Climbs and Descents	Level 3	
6. Straight & Level, Medium-bank Turns	Level 3	
7. Airspeed & Configuration Changes	Level 2	Re-emphasize good traffic scan techniques.
8. Minimum Controllable Airspeed	Level 2	VR & IR to predetermined altitude.
9. Power-off Stalls	Level 2	VR&IR
10. Approach/Landing Stalls	Level 1	VR&IR
11. Descents & Descending Turns	Level 3	Warm-up with 45 degree of bank. then 50 - 60 degrees.
12. Traffic Pattern, Approach, Landing & Parking	Level 2	Use this to lead into MCA & stalls.
13. Post-flight Discussion		Without flaps at first, then with different flap settings up to full flaps.
14. Preview Next Lesson Power-on Stalls		Start with recoveries without power, and then

- Ground Reference Maneuvers
- Landing Approaches
- Forced Landings & Emergencies

show how power reduces the altitude lost.

LESSON 4 - DUAL FLIGHT

Upon completion of this lesson the student should have the ability to recognize and recover from stalls with little or no assistance from the instructor, fly prescribed patterns by ground references, and execute a traffic pattern and landing approach with the instructor's direction.

OPERATION	COMPLETION LEVEL	COMMENTS
1. Pre-flight Discussion		Emphasize the need for good altitude, heading & airspeed control during all maneuvers.
2. Preflight Inspection, Starting Engine, & Taxiing	Level 3	
3. Takeoff (Normal & X-wind) & Departure	Level 2	
4. Straight & Level, Med. Turns, Climbs, & Descents	Level 3	VR&IR
5. Steep Turns	Level 2	Use 45 degrees of bank.
6. Minimum Controllable Airspeed	Level 3	
7. Approach/Landing Stalls	Level 2	
8. Power-on Stalls	Level 2	Use power-on stalls to intro, takeoff//departure stalls.
9. Takeoff/Departure Stalls	Level 1	Emphasize minimum altitude loss during recovery.
10. Emergency Procedures • Forced Landings • System Emergencies	Level 1	Use memorized, "immediate action" checklist, and printed checklists.
11. Ground Reference Maneuvers • Parallel Track (road or section line) • Rectangular Course • S-turns Across a Road	Level 2	Instructor demo if needed. Show effects of wind on ground track and turn radius.

12. Traffic Pattern, Approach, Landing, Parking — Level 2

13. Post-flight Discussion

14. Preview Next Lesson

- Traffic Pattern
- Takeoffs & Landings
- Emergency Procedures

LESSON 5 - DUAL FLIGHT

This lesson is a review of the flight maneuvers and procedures already covered in preparation for concentrated work on traffic patterns, takeoffs, and landings. Reasonable proficiency in coordination, airspeed control, and ground reference maneuvers should be achieved prior to the completion of this lesson.

OPERATION	COMPLETION LEVEL	COMMENTS
1. Pre-flight Discussion		
2. Pre-flight Inspection, Starting Engine	Level 4	
3. Takeoff (Normal & X-wind) & Departure	Level 3	
4. Straight & Level, Med. Turns, Climbs, Descents	Level 4	VR& IR
5. Steep Turns	Level 3	
6. Minimum Controllable Airspeed	Level 3	VR & IR Relate recovery technique to go-around
7. Approach/Landing Stalls	Level 3	Imminent and full stalls
8. Ground Reference Maneuvers • Crabs and Slips	Level 3	Demonstrate crab then slip. Explain differences and uses.
9. Takeoff/Departure Stalls	Level 2	
10. Emergency Procedures • Forced Landings • System Emergencies	Level 2	Re-emphasize pitch vs. airspeed. Do at various flap and approach power settings.
11. Glides & Descents	Level 4	
12. Traffic Pattern, Approach, & Landing	Level 2	1 or 2 times as time permits.
13. Parking and Shutdown	Level 4	
14. Post-flight Discussion		
15. Preview Next Lesson • Takeoffs & Landings (Normal & X-wind) • Accelerated Stalls • Go-Arounds • Wake Turbulence Avoidance		

LESSON 6 - DUAL FLIGHT

- The first half of this lesson is a review of previous flight maneuvers, and accelerated stalls are introduced. Concentrated takeoffs and landings should begin in the second half of this lesson.
- At the completion of this lesson the student should demonstrate a high degree of proficiency in all flight maneuvers, and be able to make takeoffs and landings with minimal assistance from the instructor.

OPERATION	COMPLETION LEVEL	COMMENTS
1. Pre-flight Discussion		Emphasize precision in airspeed & altitude control.
2. Takeoff (Normal & X-wind) & Departure	Level 4	
3. Steep Turns	Level 4	
4. Minimum Controllable Airspeed & Approach/Landing Stalls	Level 4	Do Approach/Landing. Stalls out of MCA.
5. Ground Reference Maneuvers • Rectangular Course	Level 4	Relate rectangular course to the traffic pattern.
6. Takeoff/Departure Stalls	Level 3	Imminent and full stalls.
7. Accelerated Stalls	Level 2	
8. Emergency Procedures • Forced Landings	Level 3	Simulated in the traffic pattern.
9. Traffic Pattern	Level 3	Emphasize communications and traffic vigilance.
10. Wake Turbulence Avoidance	Level 3	
11. Approach & Landing (Normal & X-wind)	Level 3	
12. Go-Arounds & Balked Landing	Level 4	
13. Post-flight Discussion		
14. Preview Next Lesson • Slips to landings • Emergency Procedures		

LESSON 7 - DUAL FLIGHT

At the completion of this lesson the student should be able to make unassisted takeoffs and landings (even in light crosswinds), and accurately fly the traffic pattern. A short review of previous flight maneuvers is introduced to break up the monotony of traffic pattern flying.

OPERATION	COMPLETION LEVEL	COMMENTS
1. Pre-flight Discussion		
2. Takeoffs (Normal & X-wind)	Level 4	
3. Approach/Landing Stalls	Level 4	
4. Accelerated Stalls	Level 3	
5. Emergency Procedures	Level 4	
• Partial Power Loss		
• Complete Power Loss		
• Electrical Failure		
• Aborted Takeoffs		
6. Forward Slips to Landing	Level 3	During no-flap landings simulating electrical failure.
7. Takeoffs & Landings	Level 4	Beware of student fatigue.
8. Wake Turbulence Avoidance	Level 4	
9. Post-flight Discussion		Critique this flight with first solo in mind for next lesson.
10. Preview Next Lesson		
• Accelerated Stalls		
• Forward Slips to Landing		
• Emergency Procedures		

LESSON 8 - DUAL AND SOLO FLIGHT

At the conclusion of the dual portion of this lesson, the student should have achieved a reasonably high degree of proficiency in all flight training maneuvers, and be able to make consistent, safe takeoffs and landings without instructor assistance or direction. Student should also be capable of recovering from poor approaches and bad bounces during landing. He/she should have demonstrated the ability to solve all ordinary problems encountered during local flights.

OPERATION	COMPLETION LEVEL	COMMENTS
1. Pre-flight Discussion		
2. Takeoffs (Normal & X-wind)	Level 4	
3. Accelerated Stalls	Level 4	
4. Emergency Procedures	Level 4	
• Forced Landings		
5. Takeoffs & Landings	Level 4	
6. Forward Slips to Landing	Level 4	During no-flap landings only.
7. SOLO FLIGHT		CONGRATULATIONS!
8. Post-Flight Discussion		Student rests. Instructor critiques student's performance, encouraging continued flight instruction towards private certificate.

FLIGHT INSTRUCTION LOG														
STUDENT:					INSTRUCTOR:									
Flight #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
LESSON #														
Pre-flight Inspection														
Engine start, Taxi and Run-up														
Radio Operations and Communications														
Takeoff (Normal)														
Crosswind Takeoff														
Climbs and Level-off														
Straight and Level														
Turns (Shallow and Medium)														
Steep Turns (50-60 degrees of bank)														
Descents (Glides) and Level-off														
Slow Flight and Minimum Controllable Airspeed														
Power-off Stalls and Approach/Landing Stalls														
Power-on Stalls and Takeoff/Departure Stalls														
Accelerated Stalls														
Emergency Procedures and Forced Landings														
Ground Reference Maneuvers														
Landings (Normal)														
Crosswind Landings														
Go-Arounds and Balked Landing Recovery														
Slips (side-slips and Forward slips) to Landing														
Use of Flaps														
Basic Instrument Flight														
Parking, Shutdown and Securing Airplane														
Vigilance, collision & wake turbulence avoid														
Judgment														
Use of Checklists														
Flight Time (This Flight)														
Total Flight Time														
Fill in the completion level the student has attained for each maneuver. A lesson is not completed until the required completion level for each maneuver in that lesson has been attained.														

Flight #	INSTRUCTORS COMMENTS	OBJECTIVES FOR NEXT FLIGHT *	Instructor's Signature Student's Signature
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			

* Include the number of the lesson to be flown and/or specific maneuvers to be accomplished in continuation of the same lesson.

EMERGENCY PROCEDURES

Cessna: 172S

CVD: 21 Jul 20 (GNS-GTN, KAP140)

Engine Failure During Takeoff Roll

1. **Throttle ..... Idle.**
2. **Brakes ..... Apply.**
3. Wing Flaps ..... Retract.
4. Mixture ..... Idle Cut Off.
5. Ignition Switch ..... Off.
6. Master Switch ..... Off.

Engine Failure Immediately After Takeoff

1. **Airspeed ..... 70 KIAS (Flaps Up) 65 KIAS (Flaps Down).**
2. Mixture ..... Idle Cut Off.
3. Fuel Shutoff Valve……Off. (Pull Full Out).
4. Ignition..... Off.
5. Wing Flaps .... As Required.
6. Master Switch..... Off.
7. Cabin Door ..... Unlatch.
8. Land .....Straight Ahead.

Engine Failure During Flight (Restart)

1. **Airspeed .....68 KIAS.**
2. **Fuel Shutoff Valve ..... On (Push full In).**
3. **Fuel Selector Valve.. Both.**
4. **Auxiliary Fuel Pump ... On.**
5. **Mixture..... Rich (if restart has not occurred).**
6. Ignition Switch .....Both (or START if propeller is stopped).
7. Auxiliary Fuel Pump……off.

Note

If fuel flow indicator immediately drops to zero (Indicating an engine driven fuel pump failure), return the Auxiliary Fuel Pump Switch to the ON position.

Forced Landing Without Engine Power

1. Passenger Seat Backs.....Most Upright Position.
2. Seats & Seat Belts ..... Secure.
3. Airspeed..... 70 KIAS (Flaps Up) 65 KIAS (Flaps Down).
4. Mixture .....Idle Cut Off.
5. Fuel Shutoff Valve.. Off (Pull Full Out).
6. Ignition Switch.....Off.
7. Wing Flaps.....As Required (30º Recommended).
8. Master Switch ..... Off (when landing is assured).
9. Doors .....Unlatched Prior To Touchdown.
10. Touchdown….Slightly Tail Low.
11. Brakes ..... Apply Heavily.

Precautionary Landing With Engine Power

1. Passenger Seat Backs.....Most Upright Position.
2. Seats and Seatbelts..... Secure.
3. Airspeed.....65 KIAS.
4. Wing Flaps ..... 20º.
5. Select Field ..... Fly Over, noting terrain and obstructions, then retract flaps upon reaching a safe altitude and airspeed.
6. Avionic Master Switch and Electrical Switches ..... Off.
7. Flaps.....30º on Final Approach.
8. Airspeed.....65 KIAS.
9. Master Switch .....Off.
10. Doors.....Unlatched Prior To Touchdown.
11. Touchdown .... Slightly Tail Low.
12. Ignition Switch .....Off.
13. Brakes ..... Apply Heavily.

Engine Fire During Start

1. **Cranking ..Continue** to get a start which would suck the flames an accumulated fuel into the engine.

If Engine Starts:

2. Power ..... 1800 RPM for a few minutes.
3. Engine.….Shutdown and Inspect for damage.

If Engine Fails to Start:

4. **Throttle ..... Full Open.**
5. **Mixture .....Idle Cut Off.**
6. **Cranking ..... Continue.**
7. **Fuel Shutoff Valve.....Off (Pull Full Out).**
8. **Auxiliary Fuel Pump Switch.Off.**
9. Fire Extinguisher ..... Activate.
10. Engine Secure ..... Secure.
    a. Master Switch .....Off.
    b. Ignition Switch.....Off.
11. Parking Brake .....Release.
12. Airplane .....Evacuate.
13. Fire ..... Extinguish using fire extinguisher, wool blanket, or dirt.
14. Fire Damage..... Inspect, repair damage or replace damaged components or wiring before conducting another flight.

Engine Fire in Flight

1. **Mixture.....Idle Cut Off.**
2. **Fuel Shutoff Valve.... Pull Out (Off).**
3. **Auxiliary Fuel Pump Switch ..... Off.**
4. **Master Switch..... Off.**
5. Cabin Heat & Air .....Off (Except Overhead Vents).
6. Airspeed ..... 100 KIAS (If fire is not extinguished, increase glide speed to find an airspeed – within airspeed limitations – which will provide an incombustible mixture).
7. Forced Landing .....Execute (as described in Emergency Landing Without Engine Power).

Electrical Fire in Flight

1. **Master Switch ..... Off.**
2. **Vents/Cabin Air/Heat. Closed**
3. **Fire Extinguisher .... Activate.**
4. Avionics Master Switch..... Off.
5. All Other Switches (except Ignition switch) ..... Off.

Warning
After discharging fire extinguisher and ascertaining that fire has been extinguished, ventilate the cabin.

6. Vents/Cabin Air/Heat.....Open when it is ascertained that fire is completely extinguished.

If fire has been extinguished and electrical power is necessary for continuance of flight to nearest suitable airport or landing area:

7. Master Switch..... On.
8. Circuit Breakers..... Check for faulty circuit, Do Not Reset.
9. Radio Switches..... Off.
10. Avionics Master Switch .... On.

(Continue on back)

11. Radio/Electrical Switches .. On one at a time, with delay after each until short circuit is localized.

Cabin Fire

1. **Master Switch.....Off.**
2. **Vents/Cabin Air/Heat . Closed** (to avoid drafts).
3. **Fire Extinguisher .... Activate.**

Warning
After discharging fire extinguisher and ascertaining that fire has been extinguished, ventilate the cabin.

4. Vents/Cabin Air/Heat….Open when it is ascertained that fire is completely extinguished.
5. Land the airplane as soon as possible to inspect for damage.

Wing Fire

1. **Landing/Taxi Lights.....Off.**
2. **Navigation Lights.....Off.**
3. **Strobe Lights .....Off.**
4. **Pitot Heat.....Off.**

Note

Perform sideslip to keep flames away from the fuel tank and cabin. Land as soon as possible using flaps only as required for final approach and touchdown.

Icing

1. **Turn Pitot Heat.....On.**
2. **Turn back or change altitude** to obtain an outside air temp that is less conducive to icing.
3. **Pull cabin heat control to full out and open defroster outlets** to obtain maximum windshield defroster airflow. Adjust cabin air control to get maximum defroster heat and airflow.
4. Refer to POH for following steps

Autopilot, Autopilot Trim, or Manual Electric Trim malfunction

(accomplish Items 1. and 2. simultaneously):

1. Airplane Control Wheel…..**Grasp Firmly** and regain aircraft control.
2. **A/P DISC/TRIM INT** Switch……. **Press** and **Hold** throughout recovery.
3. AIRCRAFT…. **Re-Trim** Manually as Needed.
4. **Auto Pilot** Circuit Breaker…. Pull

NOTE

The **Avionics Master** Switch may be used as an alternate means of removing all electric power from the autopilot and electric trim systems. If necessary, perform steps 1. thru 3. above, then turn the **Avionics Master** Switch OFF before locating and pulling the **Auto Pilot** Circuit Breaker. Turn the **Avionics Master** Switch ON as soon as possible to restore power to all other avionics equipment. Primary attitude, airspeed, directional compass, and altitude instruments will remain operational at all times.

Do Not Attempt To Re-Engage The Autopilot Following An Autopilot, Autotrim, Or Manual Electric Trim Malfunction Until The Cause For The Malfunction Has Been Corrected.

Electrical Power Supply System Malfunctions

Ammeter Shows Excessive Rate Of Charge

(Full Scale Deflection)

1. Alternator……..…Off

CAUTION

With The Alternator Side Of The Master Switch Off, Compass Deviations Of As Much As 25° May Occur.

2. Nonessential Electrical Equipment ……...Off
3. Flight……..Terminate as soon as practical

Low Voltage Annunciator (Volts) Illuminates During Flight

(Ammeter Indicate Discharge)

NOTE

Illumination of 'VOLTS' on the annunciator panel may occur during low RPM conditions with an electrical load on the system such as during a low RPM taxi. Under these conditions, the light will go out at higher RPM. The master switch need not be recycled since an over voltage condition has not occurred to deactivate the alternator system.

1. Avionics Master Switch……Off
2. Alternator Circuit Breaker……. ……Check In
3. Master Switch……..…..Off (both sides)
4. Master Switch……..On
5. Low Voltage Annunciator……. ……..…..Check Off
6. Avionics Master Switch…….On

If low voltage light illuminates again:

7. Alternator……Off

CAUTION

With The Alternator Side Of The Master Switch Off, Compass Deviations Of As Much As 25° May Occur.

8. Nonessential Radio and Electrical Equipment…….Off
9. Flight……Terminate as soon as practical

For all other Emergency Abnormal Procedures. See the POH Section 3.

This checklist is a guide to coordinate Pilot Operating Handbook and STC data applicable to this particular aircraft only. The applicable Pilot Operating Handbook and STC installations remain the official documentation for this aircraft. The pilot in command is responsible for complying with all items in the Pilot Operating Handbook and applicable STCs.

EMERGENCY PROCEDURES

Cessna: C172P (Air Plains 180 HP)
CVD: 13 May 21 (GPS)

Engine Failure During Takeoff Roll

1. **Throttle .....Idle**
2. **Brakes.....Apply**
3. Wing Flaps..... Retract
4. Mixture.....Idle Cut Off
5. Ignition Switch.....Off
6. Master Switch……Off

Engine Failure Immediately After Takeoff

1. **Airspeed .....**
   70 KIAS (Flaps Up)
   65 KIAS (Flaps Down)
2. Mixture.....Idle Cut Off
3. Fuel Selector …Off (Push & Rotate)
4. Ignition ..... Off
5. Wing Flaps..... As Required
6. Master Switch ..... Off

Engine Failure During Flight (Restart)

1. **Airspeed.....75 KIAS**
2. **Carb Heat .....On**
3. **Fuel Selector.....Both**
4. Mixture .....Rich
5. Ignition.....Both (or START if propeller is stopped)
6. Primer..... In & Locked

Forced Landing Without Engine Power

1. Seats, Seat Belts, and Shoulder Harnesses…Set & Secure
2. Airspeed..... 70 KIAS (Flaps Up)
   65 KIAS (Flaps Down)
3. Mixture .....Idle Cut Off
4. Fuel Selector.....Off (Push & Rotate)
5. Ignition .....Off
6. Wing Flaps..... As Required (30º Recommended)
7. Master Switch .....Off
8. Doors .....Unlatched (Prior To Touchdown)
9. Touchdown ..... Slightly Tail Low
10. Brakes ..... Apply Heavily

Precautionary Landing With Engine Power

1. Seats, Seat Belts, and Shoulder Harnesses……Set & Secure
2. Wing Flaps ..... 20°
3. Airspeed.....65 KIAS
4. Select Field .....Perform Fly Over Inspection
5. Avionics & Electrical Switches…Off
6. Flaps .....30º on Final Approach
7. Airspeed.....65 KIAS
8. Master Switche ..... Off
9. Doors .....Unlatched (Prior To Touchdown)
10. Touchdown ..... Slightly Tail Low
11. Ignition Switch .....Off
12. Brakes ..... Apply Heavily

Engine Fire During Start

1. **Continue Cranking Engine**
2. If Engine Starts:..... Power 1700 RPM for a few minutes
3. Engine.....Shutdown and Inspect

If Engine Fails to Start:

4. **Throttle ..... Full Open**
5. **Mixture .....Idle Cut Off**
6. **Cranking ..... Continue**
7. Fire Extinguisher ..... Obtain
8. Master Switch .....Off
9. Ignition Switch.....Off
10. Fuel Selector.....Off (Push & Rotate)
11. Fire ..... Extinguish
12. Fire Damage..... Inspect (repair damage prior to next flight)

Engine Fire in Flight

1. **Mixture .....Idle Cut Off**
2. **Fuel Selector....Off (Push & Rotate)**
3. Master Switch .....Off
4. Cabin Heat & Air .....Off (Except Overhead Vents)
5. Airspeed.....100 KIAS (If fire is not extinguished, increase glide speed to find an airspeed, which will provide an incombustible mixture.)
6. Forced Landing w/o Engine Power .....Execute

Electrical Fire in Flight

1. **Master Switch..... Off (Leave Ignition On)**
2. **Vents / Cabin Air / Heat .....Closed**
3. **Fire Extinguisher.....Activate**

Warning
After discharging an extinguisher within a closed cabin, ventilate the cabin.

4. **All Other Switches (Except Ignition) ..... Off**
5. Avionics Power Switch…….Off
6. All other switches (except ignition Switch)…Off

If fire is extinguished & electrical power is necessary

7. Master Switch..... On
8. Circuit Breakers..... Check for Faulty circuit (Do Not Reset)
9. Radio Switches……..…Off
10. Avionics Power Switch…..On
11. Radio & Electrical Switches…..On (one at a time w/ delay after each to locate short).
12. **Vents / Cabin Air / Heat ..... Open** (when assured fire is extinguished)

Cabin Fire

1. **Master Switch .....Off (Leave Ignition On)**
2. **Vents/Cabin Air/Heat . Closed**
3. **Fire Extinguisher ..... Activate**

Warning
After discharging an extinguisher within a closed cabin, ventilate the cabin.

4. Land ..As soon as possible and inspect damage

Wing Fire

1. **Landing/Taxi Lights..... Off**
2. **Pitot Heat ..... Off**
3. **Navigation Lights ..... Off**
4. **Strobe Lights ..... Off**

Note

Sideslip to keep flames away from the fuel tank and cabin, and land as soon as possible using flaps only as required for final approach and touchdown.

EMERGENCY PROCEDURES

Cessna: C172R (Air Plains-180HP)
CVD: 21 Jul 20 (GNS-GTN, KAP140)

Engine Failure During Takeoff Roll

1. **Throttle .....Idle.**
2. **Brakes.....Apply.**
3. Wing Flaps..... Retract.
4. Mixture.....Idle Cut Off.
5. Ignition Switch..... Off.
6. Master Switch ..... Off.

Engine Failure Immediately After Takeoff

1. **Airspeed..... 70 KIAS (Flaps Up) 65 KIAS (Flaps Down).**
2. Mixture .....Idle Cut Off.
3. Fuel Shutoff Valve . Off (Pull Full Out).
4. Ignition..... Off.
5. Wing Flaps .... As Required.
6. Master Switch..... Off.
7. Cabin Door .....Unlatch.
8. Land .....Straight Ahead.

Engine Failure During Flight (Restart)

1. **Airspeed.....68 KIAS.**
2. **Alternate Air.....On (Pull control full out).**
3. **Fuel Shutoff Valve .....On (Push full In).**
4. **Fuel Selector.....Both.**
5. **Auxiliary Fuel Pump ...On.**
6. **Mixture.....Rich**

(if restart has not occurred).

7. Ignition Switch .....Both (or START if propeller is stopped).

Note
If the propeller is wind milling, the engine will restart automatically within a few seconds. If the propeller has stopped (possible at low speeds), turn the ignition switch to Start, advance the throttle slowly from idle and lean the mixture from full rich as required for smooth operation.

8. Auxiliary Fuel Pump .....Off.

Note
If the fuel flow indicator immediately drops to zero (indicating an engine-driven fuel pump failure), return the Auxiliary Fuel Pump Switch to the On position.

Forced Landing Without Engine Power

1. Passenger Seat Backs.....Most Upright Position.
2. Seats & Seat Belts ..... Secure.
3. Airspeed..... 70 KIAS (Flaps Up) 65 KIAS (Flaps Down).
4. Mixture.....Idle Cut Off.
5. Fuel Shutoff Valve.. Off (Pull Full Out).
6. Ignition Switch.....Off.
7. Wing Flaps.....As Required (30º Recommended).
8. Master Switch ..... Off (when landing is assured).
9. Doors .....Unlatched Prior to Touchdown.
10. Touchdown….Slightly Tail Low.
11. Brakes ..... Apply Heavily.

Precautionary Landing With Engine Power

1. Passenger Seat Backs.....Most Upright Position.
2. Seats and Seatbelts..... Secure.
3. Airspeed.....65 KIAS.
4. Wing Flaps..... 20º.
5. Select Field ..... Fly Over, noting terrain and obstructions, then retract flaps upon reaching a safe altitude and airspeed.
6. Avionic Master Switch and Electrical Switches ..... Off.
7. Flaps.....30º on Final Approach.
8. Airspeed.....65 KIAS.
9. Master Switch .....Off.
10. Doors.....Unlatched Prior To Touchdown.
11. Touchdown.... Slightly Tail Low.
12. Ignition Switch .....Off.
13. Brakes ..... Apply Heavily.

Engine Fire During Start

1. **Cranking ..Continue** to get a start which would suck the flames an accumulated fuel into the engine.

If Engine Starts:

2. Power ..... 1800 RPM for a few minutes.
3. Engine.....Shutdown and Inspect for damage.

If Engine Fails to Start:

4. **Throttle ..... Full Open.**
5. **Mixture.....Idle Cut Off.**
6. **Cranking ..... Continue.**
7. **Fuel Shutoff Valve.....Off (Pull Full Out).**
8. Auxiliary Fuel Pump Switch..Off.
9. Fire Extinguisher .....Activate.
10. Engine Secure..... Secure.
    a. Master Switch .....Off.
    b. Ignition Switch.....Off.
11. Parking Brake.....Release.
12. Airplane .....Evacuate.
13. Fire .....Extinguish using fire extinguisher, wool blanket, or dirt.
14. Fire Damage..... Inspect, repair damage or replace damaged components or wiring before conducting another flight.

Engine Fire in Flight

1. **Mixture ..... Idle Cut Off.**
2. **Fuel Shutoff Valve ....Pull Out (Off).**
3. **Auxiliary Fuel Pump Switch ..... Off.**
4. **Master Switch ..... Off.**
5. Cabin Heat & Air..... Off (Except Overhead Vents).
6. Airspeed..... 100 KIAS (If fire is not extinguished, increase glide speed to find an airspeed – within airspeed limitations – which will provide an incombustible mixture).
7. Forced Landing .....Execute (as described in Emergency Landing Without Engine Power).

Electrical Fire in Flight

1. **Master Switch ..... Off.**
2. **Vents/Cabin Air/Heat. Closed**
3. **Fire Extinguisher .... Activate.**
4. Avionics Master Switch..... Off.
5. All Other Switches (except Ignition switch) ..... Off

Warning
After discharging fire extinguisher and ascertaining that fire has been extinguished, ventilate the cabin.

6. Vents/Cabin Air/Heat.....Open when it is ascertained that fire is completely extinguished.

If fire has been extinguished and electrical power is necessary for continuance of flight to nearest suitable airport or landing areas:

7. Master Switch ..... On.
8. Circuit Breakers .....Check for faulty circuit, Do Not Reset.
9. Radio Switches ..... Off.
10. Avionics Master Switch..... On.
11. Radio/Electrical Switches .. On one at a time, with delay after each until short circuit is localized.

Cabin Fire

1. **Master Switch.....Off.**
2. **Vents/Cabin Air/Heat . Closed** (to avoid drafts).
3. **Fire Extinguisher .... Activate.**

Warning
After discharging fire extinguisher and ascertaining that fire has been extinguished, ventilate the cabin.

4. Vents/Cabin Air/Heat….Open when it is ascertained that fire is completely extinguished.
5. Land the airplane as soon as possible to inspect for damage.

Wing Fire

1. **Landing/Taxi Lights.....Off.**
2. **Navigation Lights.....Off.**
3. **Strobe Lights .....Off.**
4. **Pitot Heat.....Off.**

Note

Perform sideslip to keep flames away from the fuel tank and cabin. Land as soon as possible using flaps only as required for final approach and touchdown.

Icing

1. **Turn Pitot Heat.....On.**
2. **Turn back or change altitude** to obtain an outside air temp that is less conducive to icing.
3. **Pull cabin heat control to full out and open defroster outlets** to obtain maximum windshield defroster airflow. Adjust cabin air control to get maximum defroster heat and airflow.
4. **Open The Throttle** to increase engine speed and minimize ice buildup on the propeller blades.
5. **Watch for signs of induction icing** and apply alternate air as required. An unexplained loss in engine speed could be caused by induction system ice or air intake filter ice. Lean the mixture for maximum RPM if alternate air is used continuously.
6. Refer to POH for following step

Autopilot, Autopilot Trim, or Manual Electric Trim malfunction

(accomplish Items 1. and 2. simultaneously):

1. Airplane Control Wheel…..**Grasp Firmly** and regain aircraft control.
2. **A/P DISC/TRIM INT** Switch…… **Press** and **Hold** throughout recovery.
3. AIRCRAFT……..**Re-Trim** Manually as Needed.
4. **Auto Pilot** Circuit Breaker….Pull

NOTE

The **Avionics Master** Switch may be used as an alternate means of removing all electric power from the autopilot and electric trim systems. If necessary perform steps 1. thru 3. above, then turn the **Avionics Master** Switch OFF before locating and pulling the **Auto Pilot** Circuit Breaker. Turn the **Avionics Master** Switch ON as soon as possible to restore power to all other avionics equipment. Primary attitude, airspeed, directional compass, and altitude instruments will remain operational at all times.

Do Not Attempt To Re-Engage The Autopilot Following An Autopilot, Autotrim, Or Manual Electric Trim Malfunction Until The Cause For The Malfunction Has Been Corrected.

Electrical Power Supply System Malfunctions

Ammeter Shows Excessive Rate Of Charge

(Full Scale Deflection)

1. Alternator……..Off

CAUTION

With The Alternator Side Of The Master Switch Off, Compass Deviations Of As Much As 25° May Occur.

2. Nonessential Electrical Equipment ……..Off
3. Flight……..Terminate as soon as practical

Low Voltage Annunciator (Volts) Illuminates During Flight

(Ammeter Indicate Discharge)

NOTE

Illumination of 'VOLTS' on the annunciator panel may occur during low RPM conditions with an electrical load on the system such as during a low RPM taxi. Under these conditions, the light will go out at higher RPM. The master switch need not be recycled since an over voltage condition has not occurred to deactivate the alternator system.

1. Avionics Master Switch…….Off
2. Alternator Circuit Breaker… ……...Check In
3. Master Switch……..….Off (both sides)
4. Master Switch……..On
5. Low Voltage Annunciator…….. ……...Check Off
6. Avionics Master Switch……..On

If low voltage light illuminates again:

7. **Alternator……..Off**

CAUTION

With The Alternator Side Of The Master Switch Off, Compass Deviations Of As Much As 25° May Occur.

8. Nonessential Radio and Electrical Equipment……..Off
9. Flight……..Terminate as soon as practical

For all other Emergency Abnormal Procedures. See the POH Section 3.

This checklist is a guide to coordinate Pilot Operating Handbook and STC data applicable to this particular aircraft only. The applicable Pilot Operating Handbook and STC installations remain the official documentation for this aircraft. The pilot in command is responsible for complying with all items in the Pilot Operating Handbook and applicable STCs

Icing

1. Pitot Heat..... On
2. Turn back or change altitude to obtain an outside air temp that is less conducive to icing.
3. Pull cabin heat control to full out and open defroster outlet to obtain maximum windshield defroster airflow.
4. Open the throttle to increase engine speed and minimize ice build-up on propeller blades
5. Watch for signs of carburetor air filter ice and apply carburetor heat as required. An unexplained loss in engine speed could be caused by carburetor ice or air intake filter ice. Lean the mixture if carb heat is used continuously.
6. Plan a landing at the nearest airport. With an extremely rapid ice build-up, select a suitable "off airport" landing site.
7. With ice accumulation of ¼ inch or more on the wing leading edges, be prepared for significantly higher stall speed.
8. Leave wing flaps retracted. With a severe ice build-up on the horizontal tail, the change in wing wake airflow direction caused by wing flap extension could result in a loss of elevator effectiveness.
9. Open left window and if practical scrape ice from a portion of the windshield for visibility in landing approach.
10. Perform landing approach using a forward slip, if necessary, for improved visibility.
11. Approach at 80 to 90 KIAS depending upon the amount of accumulation.
12. Perform a landing in level attitude.

Ditching

1. Radio .....Transmit Mayday on 121.5 giving location and intentions and squawk 7700.
2. Heavy Objects..... Secure or Jettison.
3. Seats, Seat Belts, and Shoulder Harnesses……Set & Secure
4. Approach:
   - High winds, heavy seas ...Into the Wind.
   - Light winds, heavy swells..... Parallel to swells.
5. Wing Flaps..... 20º to 30º
6. Power..... Est. a 300 FPM descent at 55 KIAS.

Note

If no power is available, approach at 70 KIAS with flaps up or at 65 KIAS with 10º flaps.

7. Cabin Doors .....Unlatch
8. Touchdown .....Level attitude at established descent rate.
9. Face.....Cushion at touchdown with folded coat or seat cushion.
10. Airplane .....Evacuate through Cabin doors. If necessary, open window and flood cabin to equalize pressure so doors can be opened.
11. Life vests and raft .....Inflate

For all other Emergency Abnormal Procedures. See the POH Section 3.

Airspeeds for Emergency Operations

Engine Failure After Takeoff:
Wing Flaps Up -- 70 KIAS
Wing Flaps Down -- 65 KIAS

Maneuvering Speed:
2550 Lbs – 105 KIAS
2150 Lbs – 95 KIAS
1750 Lbs – 85 KIAS

Maximum Glide:
2550 Lbs – 68 KIAS
2150 Lbs – 62 KIAS
1750 Lbs – 56 KIAS

Precautionary Landing With Engine Power – 65 KIAS

Landing Without Engine Power:
Wing Flaps Up – 70 KIAS
Wing Flaps Down – 65 KIAS

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Civil Air Patrol

Cessna 172P (Air Plains 180HP)
CVD: 21 Nov 20 (G500 & GTN650)

Preflight Cabin

1. AIF……Review for Airworthiness
2. POH……..Available to Pilot
3. G500 & GTN Cockpit Ref Guides…..…… Available to Pilot
4. Documents..... AROW in airplane
5. Parking Brake ..... Set
6. Hobbs & Tach .....Record
7. Fire Extinguisher Charged & Secure
8. Control/Avionics Lock .....Remove
9. Ignition Switch .....Off
10. Avionics Power Switch .....Off
11. Master Switch (ALT and BAT)...On

Warning
When turning on the master switch, using an external power source, or pulling the propeller through by hand, treat the propeller as if the ignition switch were on. Do not stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

12. Wing Flaps..... 30º
13. Fuel Quantity (L&R)..... Check
14. Avionics Power Switch……On
15. Check Avionics Fan.... ..for Audible Noise
16. Avionics Power Switch……Off
17. Pitot Heat...Remove Cover & Check
18. Lights ..... Check
19. Master Switch (Alt & BAT).....Off
20. Static Pressure Alternate Source Valve (if installed) .....Off
21. Fuel Selector Valve ..... Both

Preflight Empennage

1. Baggage Door ..... .Check Secured
2. Rudder Gust Lock .....Remove
3. Tail Tie-Down ..... Disconnect
4. Control Surfaces .....Check

Preflight Right Wing trailing edge

1. Right Flap .....Check
2. Right Aileron.....Check

Preflight Right Wing

1. Right Wingtip & Light.....Check
2. Wing Tie Down ..... Disconnect
3. Right Main Wheel Tire & Brake .....Check
4. Right Wheel Chock…….……Remove
5. Right Fuel Sump .....Drain
6. Right Fuel Quantity . Visually Check
7. Fuel Filler Cap .....Secure, vent unobstructed

Nose

1. Engine Oil Dipstick/Filler Cap.....…… Check oil level (5-8 Quarts)and secure
2. Fuel Strainer Drain Knob….. Pullout to Drain
3. Alternator Belt…….Check Condition
4. Prop & Spinner .....Check
5. Engine Cooling Air Inlets…….Clear
6. Landing Lights (if in nose)…..Check
7. Carburetor Air Filter.....Check
8. Nose Wheel, Strut & Tire .....Check
9. Towbar & Chocks……...Removed and Stowed
10. Nose Tie-Down ..... Disconnect
11. Static Source .....Check (Left side)
12. Windscreen.....Check/Clean

Preflight Left Wing

1. Left Main Wheel Tire & BrakeCheck
2. Left Wheel Chock……Remove
3. Left Fuel Sump .....Drain
4. Left Fuel Quantity.... Visually Check
5. Fuel Filler Cap .....Secure

Preflight Left Wing Leading Edge

1. Pitot Tube Cover .....Confirm Removed
2. Left Fuel Vent ..... Check Clear
3. Stall Warning .....Check clear, then check warning horn by applying suction through a clean handkerchief over the vent hole.
4. Wing Tie-Down ..... Disconnect
5. Landing & Left Wingtip Lights.....Check

Preflight Left Wing Trailing Edge

1. Left Aileron .....Check
2. Left Flap.....Check

Before Starting Engine

1. Preflight Inspection .....Complete

PASSENGER BRIEF

1. Seat Belts / Shoulder Harness
2. Personal Electronic Devices off
3. Air Vents / Comfort
4. Fire Extinguisher Location / Operation
5. Emergency Procedures & Exits

MISSION BRIEF

1. Mission Objective
2. Destination, WX, Route, Alt, ETE
3. NOTAMS
4. Crew Coordination & CRM
5. Sterile Cockpit Procedures
6. Cockpit Layout
7. Intercom & Radio Usage
8. Seats, Seatbelts, Doors
9. Emergency Action & Equipment

2. Passenger Brief.....Complete
3. Sterile Cockpit……..Comply
4. Seats / Belts / Shoulder Harness Adjust and Lock
5. Brakes……Test and Set
6. Avionics Power Switch ..... Off

Caution
The avionics power switch must be OFF during engine start to prevent possible damage to avionics.

7. Electrical Equipment..... Off
8. Circuit Breakers .....Check In
9. Autopilot (If Installed)……Off
10. Fuel Selector Valve…….. Both

Starting Engine

1. Prime .. As Required (2 to 6 strokes; none if engine is warm)
2. Carburetor Heat.....Cold
3. Throttle ..... Open 1/8 Inch
4. Mixture .....Rich
5. Flashing Beacon & Nav Lights ... On
6. Propeller Area..... Clear
7. Master Switch ..... On
8. Ignition Switch..... Start
9. Throttle.....800 to 1000 RPM
10. Oil Pressure .....Check
11. Starter ..... Check Disengaged
12. Avionics Power Switch ..... On
13. GPS & Radios ..... On
14. Taxi Lights.....As Required
15. Flaps ..... Up
16. ATIS / AWOS ..... Copy
17. Altimeter (PFD & STDBY).. Set (Verify Within 75' of Fld Elev.)
18. G500……Check LRUs & Set
19. GTN650……..Check LRUs & Set
20. Clnc Del/Gnd Control ..... Contact
21. Transponder…..…..Code/Flight ID/ALT

Taxi

1. Brakes.....Test
2. Heat / Vents / Defrost ..As Required
3. Attitude Indicator.....Verify Proper Operation
4. Turn Coordinator.....Verify Proper Operation
5. H.I. & Compass.....Verify Proper Operation

Before Takeoff - Run-Up

1. Parking Brake ..... Set
2. Seats / Belts / Shoulder Harness ..... Check Secure
3. Cabin Doors & Windows…....Closed and Locked
4. Flight Controls..... Free & Correct
5. Flight Instruments & H.I. .....Check
6. Fuel Quantity .....Check
7. Mixture .....Rich
8. Fuel Selector Valve .. Recheck Both
9. Elevator & Rudder Trim ..... Set for Takeoff
10. Throttle .....1700 RPM
11. Magnetos……..Max Drop 125 RPM ……& Max 50 RPM differential
12. Carb Heat..... Check for RPM Drop
13. Suction Gauge .....Check
14. Engine Inst & Ammeter .....Check

15. Throttle ..... Idle Check, then 800 to 1000 RPM
16. Throttle Friction Lock..... Adjust
17. Strobe Lights/Pulse Lights (If installed) .....As Desired
18. Radios……..…Set
19. Transponder ..... Code/ALT
20. Autopilot (If Installed)……Off
21. Flaps set for Takeoff..... 0°-10°
22. Primer ..... In & Locked
23. Carb Heat .....Cold
24. Takeoff Briefing .....Complete
25. Doors & Windows.....Latched
26. Lights .....Set
27. Time.....Record
28. Parking Brake ..... Release

Takeoff

1. Flaps ..... 0°-10°
2. Carb Heat.....Cold
3. Throttle .....Full Open
4. Mixture ..... Full Rich or Max Power
5. Engine Instruments ..... In Green
6. Rotate..... 55 KIAS
7. Climb Speed..... 75 to 85 KIAS
   - Short Field T.O. ... ..10° Flaps / 57 KIAS Until Clear
   - Soft Field T.O… ..... 10° Flaps / Ground Effect ASAP
8. Wing Flaps..Retract (above 70 KIAS)

Enroute Climb

1. Airspeed ..... 75 - 85 KIAS Normal

Note

If a maximum performance climb is necessary, use speeds shown in the Rate of Climb chart in POH Section 5.

2. Throttle .....Full Open
3. Fuel Selector Valve..... Both
4. Mixture ..... Full Rich or Max RPM
5. Engine Instruments ..... Check

Cruise

1. Power . 2100-2700 RPM (no more than 75% is recommended)
2. Elevator & Rudder Trim ..... Adjust
3. Mixture ..... Lean
4. Engine Instruments / Fuel ..... Check
5. Heading Indicator……Check
6. Lights..... As Required
7. Flight Plan .....Activate as Required

Descent

1. Heading Indicator……..Check
2. Altimeter .....Set
3. Fuel Selector Valve .....Both
4. Lights.....As Required
5. Engine Instruments .....Check
6. Mixture.....…Adjust for Smooth Operation (full rich for idle power)
7. Carb Heat ... Full Heat as Required

Before Landing

1. Seat, Seat Belts, Shoulder Harness ……Secure
2. Fuel Selector Valve .....Both
3. Mixture.....Rich
4. Carb Heat .... ..On (Apply Full Heat Before Closing Throttle)
5. Autopilot (If installed)……..…Off
6. Airspeed ...65-75 KIAS (Flaps Up)
7. Wing Flaps . As Desired (Below 85 KIAS)(Maximum Flap Travel is 30º)
8. Airspeed ....60-70 KIAS (Flaps Dn)
9. Trim .....Adjust
10. Touchdown.....Main Wheel First
11. Landing Roll .. Lower Nose Wheel Gently
12. Braking ..... Minimum required

Short Field Landing

1. Airspeed ...65-75 KIAS (Flaps Up)
2. Wing Flaps ... 30º (below 85 KIAS)
3. Airspeed ...Maintain 62 KIAS (Until Flare)
4. Trim .....Adjust
5. Power…….....Reduce to idle after clearing obstacle
6. Touchdown.....Main Wheels First
7. Brakes ..... Apply Heavily
8. Wing Flaps ..... Retract

Balked Landing

1. Throttle ..... Full Open
2. Carb Heat .....Cold
3. Wing Flaps .....20° (Immediately)
4. Climb Speed.....60 KIAS
5. Wing Flaps. …10º (Until Obstacles are Cleared)
6. Wing Flaps….Retract (After reaching a safe altitude and 65 KIAS)

After Landing (Clear of Runway)

1. Wing Flaps..... Up
2. Carb Heat ..... Cold
3. Lights .....As Required
4. Mixture.....Lean
5. Pitot Heat..... Off

Securing Aircraft

1. Parking Brake ..... Set
2. Transponder ..... 1200/Flight ID
3. ELT (121.5)…Confirm Not Activated
4. Throttle .....Idle
5. Avionics Power & Switches ..... Off
6. Magnetos..... Check for Ground
7. Mixture..... Idle Cut Off
8. Sterile Cockpit……..Terminate
9. Ignition Switch……..Off
10. Master Switch (ALT & BAT).... Off
11. Control/Avionics Lock ..... Install
12. Parking Brake ..... Off
13. Fuel Selector Valve.. Left or Right
14. Hobbs & Tach ..... Record
15. Aircraft..... Secured & Locked
16. Flight Plan .....Closed

V Speeds and Specs

- X-Wind (Max Demo'd) .....15 Knots
- Vr Rotation Speed .....55 KIAS
- Vx Best Angle Climb.....62 KIAS
- Vy Best Rate Climb .....73 KIAS
- Vso Stall w/ Flaps.....40 KIAS
- Vs1 Stall w/o Flaps.....50 KIAS
- Best Glide (2550 Lbs).....68 KIAS
- Va Max Abrupt Ctrl (2550 Lbs)..105 KIAS
- Va Max Abrupt Ctrl (2150 Lbs).. 95 KIAS
- Va Max Abrupt Ctrl (1750 Lbs)... 85 KIAS
- Vno Max Structural Cruise ..127 KIAS
- Vne Never Exceed .....158 KIAS
- Vfe 10°-Full Flaps.....85 KIAS
- Max Window Open Speed.158 KIAS

V Speeds and Specs are based on sea level. Consult the Air Plains Services, Corp. FAA Approved Airplane Flight Manual Supplement for V speed and Specs for operations above sea level.

General...

- EMERGENCY..... 121.50
- Unicom.....122.70-122.80-122.95 123.00-123.05
- Multicom 122.90
- Flight Service ..... 122.20 (Most Common) 122.10-122.60-123.60
- Air to Air 122.75-122.85-123.45

Transponder Codes

- 1200 ..... VFR
- 7500 .....HIJACK
- 7600 ..... LOST COMMS
- 7700 ..... EMERGENCY

Aircraft Information

- Gross Weight Capacity ..... 2550 (Takeoff) ..... 2550 (Landing)
- Engine..... Lycoming O-360-A4M
- Max Power ..... 180 BHP
- Max Engine Speed ..... 2700 RPM
- Max Continuous …….2540 RPM
- Fuel Type .....100LL (Blue)
- Fuel Capacity (Standard)…40 Gal Usable
- Fuel Capacity (Long Range)..50 Gal Usable
- Fuel Capacity (Integral)….62 Gal Usable
- Oil Type .....Aviation Grade
- Oil Capacity .....8 Qts (Minimum 5)
- Electrical .....24 - 28 Volt / 60 Amp
- Tire Pressure: Nose-45 PSI / Main-38 PSI

This checklist is a guide to coordinate Pilot Operating Handbook and STC data applicable to this particular aircraft only. The applicable Pilot Operating Handbook and STC installations remain the official documentation for this aircraft. The pilot in command is responsible for complying with all items in the Pilot Operating Handbook and applicable STCs.

Civil Air Patrol

Cessna: C172R (Air Plains-180HP)
CVD: 15 Jul 20 (GNS-GTN & KAP140)

Preflight Cabin

1. AIF…Review all & Inspect for Airworthiness.
2. Pitot Tube Cover…Remove & Check Clear
3. POH & GPS Guide……Accessible
4. Documents ..... AROW in airplane
5. Parking Brake ..... Set
6. Hobbs & Tach Time .....Record
7. Fire Extinguisher .....Charged
8. Control/Avionics Lock ..... Remove
9. Ignition Switch .....Off.
10. Avionics Master Switch .....Off.

WARNING
When the master switch is on, using an external power source, or manually rotating the propeller, treat the propeller as if the magnetos switch were on. Do not stand, nor allow anyone else to stand, within the arc of the propeller since a loose or broken wire, or a component malfunction could cause the engine to start.

11. Master Switch .....On.
12. Fuel Quantity Indicators ..... Check Quantity and Ensure Low Fuel Annunciators (L Low Fuel R) are extinguished.
13. Avionics Master Switch .....On.
14. Avionics Cooling Fan..... ..Check Audibly for Operation.
15. Avionics Master Switch .....Off.
16. Static Pressure Alternate Source Valve.....Off.
17. Annunciator Panel SwitchPlace and Hold in TST Position and ensure all annunciators illuminate.
18. Annunciator Panel Test Switch….. ....Release. Check that appropriate annunciators remain on.

Note: When Master Switch is turned ON, some annunciators will flash for approximately 10 seconds before illuminating steadily. When panel TST switch is toggled up and held in position, all remaining lights will flash until the switch is released.

19. Fuel Selector Valve.....Both.
20. Fuel Shutoff Valve.....On (Push Full In).
21. Flaps.....Extend.
22. Pitot HeatOn. (Carefully check that pitot tube is warm to the touch within 30 seconds.)
23. Pitot Heat ..... Off.
24. Master Switch ..... Off.
25. Elevator Trim .....Set for takeoff.
26. Baggage Door ..Check, lock with key.
27. Autopilot Static Source Opening (if installed) ..... Check for blockage.

Preflight Empennage

1. Rudder Gust Lock (if installed)…Remove.
2. Tail Tie-Down ..... Disconnect.
3. Control Surfaces...Check freedom of movement and security.
4. Trim Tab ..... Check security.
5. Antennas ..... Check for security of attachment and general condition.

Preflight Right Wing Trailing Edge

1. Aileron .....Check freedom of movement and security.
2. Flap .....Check security & condition.

Preflight Right Wing

1. Wing Tie Down ..... Disconnect.
2. Fuel Tank Vent Opening…Check for Stoppage
3. Main Wheel Tire ... Check for proper inflation and general condition.
4. Fuel Tank Sump Drain Valves …Drain at least a cupful of fuel from each sump location to check for water, sediment, and proper fuel grade before each flight and after each refueling. If water is observed, take further samples until clear and then gently rock wings and lower tail to the ground to move additional contaminants to the sampling point. Take repeated samples from all fuel drain points until **all** contamination has been removed. If contaminants are still present, refer to Warning below and do not fly airplane.

WARNING: If, after repeated sampling, evidence of contamination still exists, the airplane should not be flown. Tanks should be drained and system purged by qualified maintenance personnel. All evidence of contamination must be removed before further flight.

5. Fuel Quantity ..... Check Visually.
6. Fuel Filler Cap ..... Secure and Vent Unobstructed.

Preflight Nose

1. Fuel Strainer Valve……Drain, see Preflight Right Wing step #4
2. Engine Oil Dipstick/Filler Cap..... .....Check oil level and secure. (5-8 Quarts, 8 Quarts for extended flights)
3. Alternator Belt.....Check Condition.
4. Engine Cooling Air Inlets ..... .Clear.
5. Propeller & Spinner .....Check.
6. Air Filter .....Check.
7. Nose Wheel Strut and Tire… .Check for proper inflation and general condition
8. Towbar…….Removed and Stowed.
9. Left Static Source Opening ..Check.

Preflight Left Wing

1. Left Fuel Quantity ... Visually Check.
2. Fuel Filler Cap .....Secure & Vent unobstructed.
3. Fuel Tank Sump Drain Valves.Drain. see Preflight Right Wing step #4
4. Main Wheel Tire .....Check for proper inflation and general condition

Preflight Left Wing Leading Edge

1. Fuel Tank Vent OpeningCheck for blockage.
2. Stall Warning Opening…Check (for blockage).
3. Wing Tie Down..... Disconnect.
4. Landing/Taxi light(s) .....Check.

Preflight Left Wing Trailing Edge

1. Left Aileron .....Check.
2. Left Flap.....Check.

Before Starting Engine

1. Preflight Inspection .....Complete.

PASSENGER BRIEF

1. **Seat Belts / Shoulder Harness**
2. **Personal Electronic Devices off**
3. **Air Vents / Comfort**
4. **Fire Extinguisher Location / Operation**
5. **Emergency Procedures & Exits**

MISSION BRIEF

1. **Mission Objective**
2. **Destination, WX, Route, Alt, ETE**
3. **NOTAMS**
4. **Crew Coordination & CRM**
5. **Sterile Cockpit Procedures**
6. **Cockpit Layout**
7. **Intercom & Radio Usage**
8. **Seats, Seatbelts, Doors**
9. **Emergency Action & Equipment**

2. Passenger Brief ..... Complete.
3. Sterile Cockpit……..Comply
4. Seats / Belts / Shoulder Harness Adjust and lock, check initial reel (front & rear).
5. Brakes.....Test & Set.
6. Circuit Breakers .....Check In.
7. Electrical Equipment ..... Off.

Caution: The avionics master switch must be off during engine start to prevent possible damage to avionics.

8. Avionics Master Switch..... Off.
9. Fuel Selector Valve ..... Both.
10. Fuel Shutoff Valve….On (push full in).
11. Avionics Circuit Breakers.Check In.

Starting Engine (Using Battery)

1. Alternate Air ..... Off.
2. Throttle Control ..... Open ¼ Inch.
3. Mixture Control ..... Idle Cut Off.
4. Propeller Area..... Clear.
5. Master Switch ..... On.
6. Flashing Beacon ..... On.
7. Auxiliary Fuel Pump Switch ..... On.
8. Mixture .....Advance to obtain 3 to 5 GPH fuel flow, then return to Idle Cut Off position.

Note
If engine is warm, omit priming procedure of step 8 above.

9. Ignition Switch..... Start.
10. Mixture…….. Advance smoothly to Rich when engine starts.

Note: If the engine floods, turn off aux. fuel pump, place mixture to idle cut off position, open the throttle control ½ to full, and crank engine. When the engine fires, advance the mixture control to the Full Rich position and retard throttle promptly.

11. Oil Pressure .....Check.
12. Auxiliary Fuel Pump ..... Off.
13. Nav Lights .....On as required.
14. Avionics Master Switch ..... On.

15. GPS:
    - Database Currency……..Check
    - GPS status……Check
    - Flight Plan…..Enter, as desired
16. Manual Electric Trim…….Check
17. Autopilot……Engage
18. Flight Controls… ……Move, verify autopilot can be overpowered
19. A/P Disc/Trim Int…… Press, verify autopilot disconnects
20. Radios .....On
21. ATIS/AWOS/ASOS……..Copy
22. Clearance Delivery/Ground…..Call
23. Transponder ....Code/Flight ID/ALT
24. Flaps.....Retract

Taxi

1. Mixture Control.... Lean as required.
2. Heat / Vents / Defrost..As Required.
3. Brakes ..... Release and Test.
4. Attitude Indicator.Verify Proper Ops
5. Turn Coordinator.....Verify Ops.
6. H.I. & Compass..Verify Proper Ops.

Before Takeoff - Run-Up

1. Parking Brake ..... Set.
2. Passenger Seat Backs…….Most upright position.
3. Seats and Seat Belts.. ..... Check Secure.
4. Cabin Doors .... Closed and Locked.
5. Flight Controls.....Free & Correct.
6. Flight Instruments ..... Check & Set.
7. Altimeter……...Set
8. KAP 140:
    - Baro / Altitude Preselect ….Set
9. Fuel Quantity..... Check.
10. Mixture..... Rich.
11. Fuel Selector Valve Recheck Both.
12. Elevator Trim .....Set for Takeoff.
13. Throttle Control..... 1800 RPM.
    a. Magnetos… Check (RPM drop 150 or 50 differential between magnetos.)
    b. Alternate Air Control.... ..Check (Slight RPM Drop).
    c. Suction Gage ..... Check.
    d. Engine Instruments..... Check.
    e. Ammeter ..... Check.
14. Annunciator Panel .....Ensure no annunciators are illuminated.
15. Throttle..... Check Idle.
16. Throttle..... 1000 RPM or less.
17. Throttle Friction Lock ..... Adjust.
18. Strobe Lights.....As Desired.
19. Radios & Avionics.....Set.
20. NAV/GPS Switch (if installed) ...Set.
21. Com & Nav Frequency(s).....Set.
22. Transponder……..… …Code/ALT
23. Autopilot..... Off.
24. Wing Flaps..Set of Takeoff (0-10°).
25. Cabin Windows…Closed &Locked
26. Brakes.....Release.

Takeoff

1. Wing Flaps .....0°-10°.
2. Throttle .....Full Open.
3. Mixture..... …..Rich (above 3000 ft., lean to obtain max. RPM).
4. Elevator Control .....Lift Nose Wheel (at 55 KIAS).
5. Climb Speed.....70 - 80 KIAS.
    - Short Field T.O.....10° Flaps / 56 KIAS Until Clear Obstacles.
    - Soft Field T.O .10° Flaps / Ground Effect ASAP.
6. Wing Flaps ..Retract at safe altitude above 65 KIAS.

Enroute Climb

1. Airspeed .....70-85 KIAS.

Note: If a maximum performance climb is necessary, use speeds shown in the Rate Of Climb chart in section 5 of the POH.

2. Throttle……...Full Open.
3. Mixture……. Rich (above 3000 ft., lean for max. RPM)
4. Sterile Cockpit……...Terminate

Cruise

1. Power .... 2100-2700 RPM (no more than 75% is recommended).
2. Elevator Trim……Adjust, (if autopilot not engaged)
3. Mixture..... Lean.

Descent

1. Power……...As Desired.
2. Mixture. Adjust for smooth ops (full rich for idle power).
3. Alternate Air.. On (if conditions are present for icing to exist).
4. Fuel Selector Valve ..... Both
5. Altimeter……...Set
6. KAP 140:
    - Baro / Altitude Preselect ….Set
7. NAV/GPS Switch (if installed) ..... Set
8. Wing Flaps.... ……As Desired.

Before Landing

1. Sterile Cockpit……Comply
2. Pilot and Passenger Seat Backs.. .. Most Upright Position.
3. Seats & Seat Belts..Secured & Lock.
4. Fuel Selector Valve .....Both.
5. Mixture Control .....Rich.
6. Alternate Air.....On (if conditions are present for icing to exist).
7. Landing & Taxi Lights..... On.
8. Autopilot..... Off.

Normal Landing

1. Airspeed ..... 65 - 75 KIAS (flaps up).
2. Wing Flaps ..... As Desired (0º - 10º below 110 KIAS) (10º -30º below 85 KIAS).
3. Airspeed .. .60 - 70 KIAS (Flaps Down).
4. Touchdown .....Main Wheel First.
5. Landing Roll.....Lower Nose Wheel Gently.
6. Braking .....Minimum Required.

Balked Landing

1. Throttle ..... Full Open.
2. Alternate Air..... Off (if pulled).
3. Wing Flaps.....Retract to 20°.
4. Climb Speed .....60 KIAS.
5. Wing Flaps. ..10º (until obstacles are cleared)…RETRACT (after reaching a safe altitude and 65 KIAS)

After Landing (Clear of Runway)

1. Wing Flaps..... Up.
2. Lights ..... As Required.
3. Mixture.....Lean.
4. Pitot Heat..... Off.

Securing Aircraft

1. Parking Brake.....Set.
2. Transponder ……..1200/Flight ID
3. Electrical Equipment, Autopilot….Off.
4. Avionics Master Switch ..... Off.
5. Magnetos ..... Check for Ground.
6. Mixture ..... Idle Cut-Off.
7. Sterile Cockpit……..……Terminate
8. Ignition Switch..... Off.
9. Master Switch ..... Off.
10. Control/Avionics Lock ..... Install.
11. Parking Brake ..... Off.
12. Fuel Selector ..... Left or Right.
13. Hobbs & Tach ..... Record.
14. Aircraft ..... Secured & Locked.
15. Flight Plan .....Closed.

V Speeds and Specs

- X-Wind (Max Demo'd)..... 15 Knots
- Best Glide Speed..... 68 KIAS
- Vx (Sea Level) ..... 62 KIAS
- Vy (Sea Level) ..... 74 KIAS
- Vso Stall w/ Flaps ..... 40 KIAS
- Vs1 Stall w/o Flaps ..... 48 KIAS
- Va Max Abrupt Ctrl (2550 Lbs)..... 105 KIAS
- Va Max Abrupt Ctrl (2150 Lbs)..... 98 KIAS
- Va Max Abrupt Ctrl (1900 Lbs)..... 90 KIAS
- Vno Max Structural Cruise..... 129 KIAS
- Vne Never Exceed..... 163 KIAS

V Speeds & Specs are based on sea level. Consult the Air Plains Services, Corp. FAA Approved Airplane Flight Manual Supplement for V speed & Specs for operations above sea level.

Aircraft Information

- Gross Weight.....2550 lbs.
- Engine..... Lycoming IO-360-L2A
- Max Power.....180 BHP
- Max Engine Speed ..... 2700 RPM
- Fuel Type.....100LL (Blue)
- Fuel Capacity..... 53 Gal Usable
- Oil Type ..... Aviation Grade
- Oil Capacity .....8 Qts (Minimum 5)
- Electrical ..... 24 - 28 Volt / 60 Amp
- Tire Pressure: Nose-45 PSI / Main-38 PSI

This checklist is a guide to coordinate Pilot Operating Handbook and STC data applicable to this particular aircraft only. The applicable Pilot Operating Handbook and STC installations remain the official documentation for this aircraft. The pilot in command is responsible for complying with all items in the Pilot Operating Handbook and applicable STCs.

Civil Air Patrol

Cessna: C172S

CVD: 15 Jul 20 (GNS-GTN & KAP140)

Preflight Cabin

1. AIF…Review all & Inspect for Airworthiness
2. Pitot Tube Cover...Remove & Check Clear
3. POH & GPS Guide..... Accessible.
4. Weight & Balance ..... Checked.
5. Parking Brake ..... Set.
6. Hobbs & Tach Time .....Record
7. Control Wheel Lock..... Remove.
8. Ignition Switch.....Off.

WARNING
When the master switch is on, using an external power source, or manually rotating the propeller, treat the propeller as if the magnetos switch were on. Do not stand, nor allow anyone else to stand, within the arc of the propeller since a loose or broken wire, or a component malfunction could cause the engine to start.

9. Avionics Master Switch.....Off.
10. Master Switch.....On.
11. Fuel Quantity Indicators ..... Check Quantity and Ensure Low Fuel Annunciators (L Low Fuel R) are extinguished.
12. Avionics Master Switch .....On.
13. Avionics Cooling Fan..... ..Check Audibly for Operation.
14. Avionics Master Switch .....Off.
15. Static Press. Alt. Source Valve.....Off.
16. Annunciator Panel Switch.. .. Place and Hold in TST Position and ensure all amber and red annunciators illuminate.
17. Annunciator Panel Test Switch….. ....Release. Check that appropriate annunciators remain on.

Note: When Master Switch is turned ON, some annunciators will flash for approximately 10 seconds before illuminating steadily. When panel TST switch is toggled up and held in position, all remaining lights will flash until the switch is released.

18. Fuel Selector Valve ..... Both.
19. Fuel Shutoff Valve.....On (Push Full In).
20. Flaps ..... Extend.
21. Pitot Heat… .. On. (Carefully check that pitot tube is warm to the touch within 30 seconds.)
22. Pitot Heat ..... Off.
23. Master Switch ..... Off.
24. Baggage Door ....Check, lock with key.

Preflight Empennage

1. Rudder Gust Lock (if installed) .Remove.
2. Tail Tie-Down ..... Disconnect.
3. Control Surfaces...Check freedom of movement and security.
4. Trim Tab ..... Check security.
5. Antennas ..... Check for security of attachment and general condition.

Preflight Right Wing Trailing Edge

1. Aileron .....Check freedom of movement and security.
2. Flap .....Check security & condition.

Preflight Right Wing

1. Wing Tie Down ..... Disconnect.
2. Main Wheel Tire ... Check for proper inflation and general condition.
3. Fuel Tank Sump Drain Valves ..... Drain at least a cupful of fuel from each sump location to check for water, sediment, and proper fuel grade before each flight and after each refueling. If water is observed, take further samples until clear and then gently rock wings and lower tail to the ground to move additional contaminants to the sampling point. Take repeated samples from all fuel drain points until **all** contamination has been removed. If contaminants are still present, refer to Warning below and do not fly airplane.

WARNING
If, after repeated sampling, evidence of contamination still exists, the airplane should not be flown. Tanks should be drained and system purged by qualified maintenance personnel. All evidence of contamination must be removed before further flight.

4. Fuel Quantity Check Visually.
5. Fuel Filler Cap....Secure & Vent Unobstructed.

Preflight Nose

2. Fuel Strainer Valve……Drain, see Preflight Right Wing step #3
1. Engine Oil Dipstick/Filler Cap..... .....Check oil level and secure. (5-8 Quarts, 8 Quarts for extended flights)
3. Alternator Belt……Check Condition.
4. Engine Cooling Air Inlets ..... Clear.
5. Propeller & Spinner .....Check.
6. Air Filter .....Check.
7. Nose Wheel Strut and Tire….Check for proper inflation and general condition.
8. Towbar……Removed and Stowed.
9. Left Static Source Opening ..Check.

Preflight Left Wing

1. Left Fuel Quantity ... Visually Check.
2. Fuel Filler Cap .....Secure & Vent unobstructed.
3. Fuel Strainer Valve……Drain, see Preflight Right Wing step #3
4. Main Wheel Tire ... Check for proper inflation and general condition.

Preflight Left Wing Leading Edge

1. Fuel Tank Vent Opening ..Check for blockage.
2. Stall Warning Opening .....Check for blockage.
3. Wing Tie Down ..... Disconnect.
4. Landing/Taxi light(s) .....Check.

Preflight Left Wing Trailing Edge

1. Left Aileron .....Check.
2. Left Flap.....Check.

Before Starting Engine

1. Preflight Inspection .....Complete.

PASSENGER BRIEF

1. Seat Belts / Shoulder Harness
2. Personal Electronic Devices off
3. Air Vents / Comfort
4. Fire Extinguisher Location / Operation
5. Emergency Procedures & Exits

MISSION BRIEF

1. Mission Objective
2. Destination, WX, Route, Alt, ETE
3. NOTAMS
4. Crew Coordination & CRM
5. Sterile Cockpit Procedures
6. Cockpit Layout
7. Intercom & Radio Usage
8. Seats, Seatbelts, Doors
9. Emergency Action & Equipment

2. Passenger Brief ..... Complete.
3. Sterile Cockpit……..Comply
4. Seats / Belts / Shoulder Harness Adjust and lock, check initial reel (front & rear).
5. Brakes.....Test & Set.
6. Circuit Breakers .....Check In.
7. Electrical Equipment, Autopilot..Off.

Caution: The avionics master switch must be off during engine start to prevent possible damage to avionics.

8. Avionics Master Switch.....Off.
9. Fuel Selector Valve ..... Both.
10. Fuel Shutoff ValveOn (push full in).
11. Avionics Circuit Breakers.Check In.

Starting Engine (Using Battery)

1. Throttle Control..... Open ¼ Inch.
2. Mixture Control ..... Idle Cut Off.
3. Propeller Area..... Clear.
4. Master Switch ..... On.
5. Flashing Beacon..... On.

Note: If engine is warm, omit priming procedure of step 6,7,8 below

6. Auxiliary Fuel Pump Switch ..... On.
7. Mixture.... ……Set to Full Rich, until stable fuel flow is indicated (usually 3-5 seconds), then set to Idle Cut Off
8. Auxiliary Fuel Pump Switch ..... Off.
9. Ignition Switch..... Start.
10. Mixture…….. Advance smoothly to ……Rich when engine starts.

Note: If the engine floods, turn off aux. fuel pump, place mixture in idle cut off, open throttle ½ to full, and crank engine. When the engine fires, advance mixture to the full rich & retard throttle promptly.

11. Oil Pressure .....Check.
12. Nav Lights…….On, as required.
13. Avionics Master Switch ..... On.
14. GPS:
    - Database Currency……Check
    - GPS Status……Check
    - Flight Plan……Enter, as desired
15. Manual Electric Trim……..Check

16. Autopilot……On
17. Flight Controls… ……Move, verify autopilot can be overpowered
18. A/P Disc/Trim Int…… Press, verify autopilot disconnects
19. Radios .....On
20. ATIS/AWOS/ASOS……..Copy
21. Altimeter……Set
22. Clearance Delivery/Ground…..Call
23. Transponder ....Code/Flight ID/ALT
24. Flaps .....Retract.

Taxi

1. Mixture Control.... Lean as required.
2. Heat / Vents / Defrost..As Required.
3. Brakes ..... Release and Test.
4. Attitude Indicator Verify Proper Ops.
5. Turn Coordinator .....Verify Ops.
6. H.I. & Compass..Verify Proper Ops.

Before Takeoff - Run-Up

1. Parking Brake ..... Set.
2. Passenger Seat Backs…….Most upright position.
3. Seats & Seat Belts.. .Check Secure.
4. Cabin Doors .... Closed and Locked.
5. Flight Controls.....Free & Correct.
6. Flight Instruments…….Check, and Set
7. Altimeter……Recheck
8. KAP 140:
   - Baro / Altitude Preselect …..Set
9. Fuel Quantity..... Check.
10. Mixture..... Rich.
11. Fuel Selector Valve Recheck Both.
12. Elevator Trim .....Set for Takeoff.
13. Throttle Control..... 1800 RPM.
    a. Magnetos… Check (RPM drop 150 or 50 differential between magnetos.)
    b. Alternate Air Control.... ..Check (Slight RPM Drop).
    c. Suction Gage ..... Check.
    d. Engine Instruments ..... Check.
    e. Ammeter……..Check
14. Annunciator Panel ..... Ensure no annunciators are illuminated.
15. Throttle ..... Check Idle.
16. Throttle .....1000 RPM or less.
17. Throttle Friction Lock..... Adjust.
18. Strobe Lights .....As Desired.
19. Radios & Avionics.....Set.
20. NAV/GPS Switch (if installed) ...Set.
21. Com & Nav Frequency(s) .....Set.
22. Transponder…….. …Code/ALT
23. Autopilot..... Off.
24. Wing Flaps..Set of Takeoff (0-10°).
25. Cabin Windows…Closed &Locked
26. Brakes.....Release

Takeoff

1. Wing Flaps ..... 0°-10°.
2. Throttle .....Full Open.
3. Mixture….Rich (above 3000 ft., lean to obtain max. RPM).
4. Elevator Control..Lift Nose Wheel (at 55 KIAS).
5. Climb Speed.....70 - 80 KIAS.
   - Short Field T.O.....10° Flaps / 56 KIAS Until Clear Obstacles.
   - Soft Field T.O .10° Flaps / Ground Effect ASAP.
6. Wing Flaps .. Retract at safe altitude above 65 KIAS.

Enroute Climb

1. Airspeed .....70 - 85 KIAS.

Note: If a maximum performance climb is necessary, use speeds shown in the Max Rate Of Climb chart in section 5 of the POH.

2. Throttle ..... ……...Full Open.
3. Mixture……. Rich (above 3000 ft., lean for max. RPM).
4. Sterile Cockpit……..Terminate.

Cruise

1. Power .... 2100-2700 RPM (no more than 75% is recommended).
2. Elevator Trim……Adjust. (if autopilot not engaged)
3. Mixture ……Lean.

Descent

1. Power……As Desired.
2. Mixture. Adjust for smooth ops (full rich for idle power).
3. Fuel Selector Valve .....Both
4. Altimeter……...Set
5. KAP 140:
   - Baro / Altitude Preselect ……Set
6. NAV/GPS Switch (if installed)……Set
7. Wing Flaps ... ……As Desired.

Before Landing

1. Sterile Cockpit……Comply.
2. Pilot and Passenger Seat Backs ..... ……Most Upright Position.
3. Seats & Seat Belts..Secured & Lock.
4. Fuel Selector Valve .....Both.
5. Mixture Control ……Rich.
6. Landing & Taxi Lights..... On.
7. Autopilot..... Off.

Normal Landing

1. Airspeed ..... 65 - 75 KIAS (flaps up).
2. Wing Flaps..... As Desired (0º - 10º below 110 KIAS) (10º -30º below 85 KIAS).
3. Airspeed...60 - 70 KIAS (Flaps Down).
4. Touchdown .....Main Wheel First.
5. Landing Roll .....Lower Nose Wheel Gently.
6. Braking .....Minimum Required.

Balked Landing

1. Throttle ..... Full Open.
2. Wing Flaps.....Retract to 20°.
3. Climb Speed .....60 KIAS.
4. Wing Flaps…10º (until obstacles are cleared). RETRACT (after reaching a safe altitude and 65 KIAS)

After Landing (Clear of Runway)

1. Wing Flaps..... Up.
2. Lights ..... As Required.
3. Mixture .....Lean.
4. Pitot Heat..... Off.

Securing Aircraft

1. Parking Brake .....Set.
2. Transponder ..……1200/Flight ID
3. Electrical Equipment, Autopilot….Off.
4. Avionics Master Switch ..... Off.
5. Magnetos..... Check for Ground.
6. Mixture……..Idle Cut-Off.
7. Sterile Cockpit……..…Terminate.
8. Ignition Switch ..... Off.
9. Master Switch ..... Off.
10. Control/Avionics Lock .....Install.
11. Parking Brake ..... Off.
12. Fuel Selector..... Left or Right.
13. Hobbs & Tach ..... Record.
14. Aircraft..... Secured & Locked.
15. Flight Plan .....Closed.

V Speeds and Specs

- X-Wind (Max Demo'd).....15 Knots
- Best Glide Speed.....68 KIAS (flaps up)
- Vx (Sea Level) .....62 KIAS
- Vy (Sea Level). .....74 KIAS
- Vso Stall w/ Flaps. .....40 KIAS
- Vs1 Stall w/o Flaps. .....48 KIAS
- Va Max Abrupt Ctrl (2550 Lbs) 105 KIAS
- Va Max Abrupt Ctrl (2200 Lbs) ..98 KIAS
- Va Max Abrupt Ctrl (1900 Lbs). ..90 KIAS
- Vno Max Structural Cruise .....129 KIAS
- Vne Never Exceed.....163 KIAS

V Speeds and Specs are based on sea level. Consult the Air Plains Services, Corp. FAA Approved Airplane Flight Manual Supplement for V speed and Specs for operations above sea level.

Aircraft Information

- Gross Weight.....2550 lbs.
- Engine..... Lycoming IO-360-L2A
- Max Power.....180 BHP
- Max Engine Speed ..... 2700 RPM
- Fuel Type.....100LL (Blue)
- Fuel Capacity.....53 Gal Usable
- Oil Type .....Aviation Grade
- Oil Capacity .....8 Qts (Minimum 5)
- Electrical .....24 - 28 Volt / 60 Amp
- Tire Press:
  Nose-45 PSI / Main-38 PSI

This checklist is a guide to coordinate Pilot Operating Handbook and STC data applicable to this particular aircraft only. The applicable Pilot Operating Handbook & STC installations remain the official documentation for this aircraft. The pilot in command is responsible for complying with all items in the POH and applicable STCs.

Advanced National Flight Academy Standardized Maneuvers Guide

C-172 Standardized Procedures and Maneuvers

Pre-Maneuver Checklist:

- ALTITUDE – Safe for Maneuver
- CLEARING TURNS – Safe Airspace
- CGUMPS Checklist - Complete
- EMERGENCY LANDING FIELD – Within Glide Range
- LIGHTS ON,
- HEADING – Bug it!
- AIRSPEED/POWER SETTING – Stabilized/Baseline
- ALTITUDE – Note it!

C-172 V-Speeds: All Speeds are Listed in KIAS

Demonstrated X-Wind Component	15
Vr	___
Vx (0˚ Flaps)	___
Vy (0˚ Flaps)	___
Vso	___
Vs1	___
Va (2550 lbs)	___
Vno	___
Vne	___
Vfe (30˚ Flaps)	___
Best Glide (2550 lbs)	___
Obstacle Clearance Airspeed (10˚ Flaps)	___
Max Window Open Speed	___

Baseline (Cruise) Pitch and Power Settings:

- Power Setting: 2100 RPM
- Resulting Airspeed: 90 KIAS (Maintain Altitude)
- Pitch + Power = PERFORMANCE

FLYING PRIORITIES

1. **Aviate**
2. **Navigate**
3. **Communicate**

ALWAYS MAINTAIN AIRCRAFT CONTROL

All Takeoffs – VERBAL CALLOUTS

- Taxi into position on runway – **" I IDENTIFY RUNWAY XX"** (Instructor – "I VERIFY RUNWAY XX")
- After applying full power, check tachometer – **"DEVELOPING TAKEOFF POWER"**
- After applying full power, check engine gauges – **"ENGINE INSTRUMENTS IN THE GREEN"**
- After beginning takeoff roll – **"AIRSPEED IS ALIVE"**
- Upon reaching rotation speed – **"VR ROTATE … POSITIVE RATE"** (when achieved)
- Upon reaching obstacle clearance height – **"OBSTACLE CLEARANCE ASSURED"**

All Landings – VERBAL CALLOUTS

- While on Base, visually clear both extended final and runway – "**FINAL IS CLEAR … RUNWAY IS CLEAR"**
- By 300' AFE, complete a final CGUMPS Check
- If the approach is stabilized, call out, **"200 FEET, STABILIZED, CONTINUING"**
- If the approach is not stabilized, **"200 FEET, NOT STABILIZED, GOING AROUND"**

Common Abbreviations and Acronyms Used in this Guide

- CGUMPS – Carb Heat, Gas, Undercarriage, Mixture, Pumps, Switches
- AFE – Above Field Elevation
- TPA Traffic Pattern Altitude
- MCA – Minimum Controllable Airspeed
- AS – Airspeed (Tolerance, Setting, or Change)
- ROC – Rate of Climb
- HDG – Heading tolerance in maneuver

NORMAL TAKEOFF (AS +10/-5)

- Taxi, Run-up, Before Takeoff Checks
- Cross the hold short line, taxi into position
- Nose wheel straight with centerline, Ailerons into the wind
- Full throttle – **2300 rpm** minimum – Check Tach and Engine Gauges
- Vr – **55 KIAS**, Pitch **nose up 8 degrees**
- Establish crab for crosswind
- Climb out at Vx/Vy as required – **62/76 KIAS**
- 300' prior to TPA, turn crosswind
- 1000' AGL, Climb Checklist

NORMAL LANDING (AS +10/-5)

- Descent, Pre-landing checks before Downwind
- Enter 45˚ Midfield downwind at TPA
- Abeam numbers – Carb Heat, Power to **1500 rpm**
- Maintain altitude, dissipate airspeed (**85 KIAS**)
- **Flaps 10˚, Airspeed 80 KIAS, 500 fpm descent on Downwind**
- Turn base when TDZ is 45˚ between wind and fuselage
- **Flaps 20˚ on Base, 70 KIAS**
- Lead turn to final to roll out on extended centerline
- Pitch for airspeed, power for altitude
- **Flaps 30˚ on Final, 65 KIAS**
- Rudder to align longitudinal axis with centerline, Ailerons for wind drift
- Cross threshold, power slowly to idle, raise nose with far end of runway
- Hold nose off runway until main wheels make contact
- Lower nose and apply brakes

SHORT FIELD TAKEOFF (10˚ Flaps, AS +10/-5)

- Taxi, Run-up, Before Takeoff Checks
- Cross the hold short line – **USE ALL AVAILABLE RUNWAY**
- Nose wheel straight, Ailerons into the wind, Elevator neutral
- Hold Brakes, Apply Max Power – **2300 rpm** minimum
- Check Tach and Engine Gauges, Release Brakes
- Airspeed Alive, **Rotate at 51 KIAS**
- Climb out at **57 KIAS** until clear of obstacle
- Obstacle Cleared - **Accelerate Vx – 62 KIAS, Flaps to 0˚**
- Climb out at Vx/Vy as required – **62/76 KIAS**
- 300' prior to TPA, turn crosswind
- 1000' AGL, Climb Checklist

SHORT FIELD LANDING (AS +10/-5, Touchdown Spot +200/-0ft)

- Descent, Pre-landing checks before Downwind
- Enter 45˚ Midfield downwind at TPA
- Abeam numbers – Carb Heat, Power to **1500 rpm**
- Maintain altitude, dissipate airspeed (**110 KIAS**)
- **Flaps 10˚, Airspeed 85 KIAS, 500 fpm descent on Downwind**
- Turn base when TDZ is 45˚ between wind and fuselage
- **Flaps 20˚ on Base, 75 KIAS**
- Pitch for airspeed, power for altitude
- **Flaps 30˚ on Final, 62 KIAS**
- Cross threshold, power slowly to idle, raise nose with far end of runway
- Touch down at **MCA**, in power-off stall pitch attitude on main wheels first
- After touchdown, lower nose, Retract flaps and apply max braking (**NOSE, FLAPS, TOES**)

SOFT FIELD TAKEOFF (10˚ FLAPS, AS +10/-5)

- Taxi, Run-up, Before Takeoff Checks
- **Yoke comes full back, keep aircraft on the roll (rudders, not brakes to steer**)
- Align with centerline, Apply Max Power **– 2300 RPM**
- Check Gauges
- Rotate at minimum speed into ground effect
- As main wheels lift off, lower pitch attitude to establish and maintain level flight attitude – build airspeed in ground effect, do not climb!
- Climb out at **57 KIAS** until clear of obstacle
- Obstacle Cleared - **Accelerate Vx – 62 KIAS, Flaps to 0˚**
- Climb out at Vx/Vy as required – **62/76 KIAS**
- Within 300' of TPA, turn crosswind
- 1000' AGL, Climb Checklist

NOTE: The amount of pitch up must not be so excessive to cause a tail strike

SOFT FIELD LANDING (AS +10/-5)

- Descent, Pre-landing checks before Downwind
- Enter 45˚ Midfield downwind at TPA
- Abeam numbers – Carb Heat, Power to **1500 rpm**
- Maintain altitude, dissipate airspeed (**110 KIAS**)
- **Flaps 10˚, Airspeed 85 KIAS, 500 fpm descent on Downwind**
- Turn base when TDZ is 45˚ between wind and fuselage
- **Flaps 20˚ on Base, 75 KIAS**
- Pitch for airspeed, power for altitude
- **Flaps 30˚ on Final, 62 KIAS**
- Crossing threshold, power to 1200 rpm
- Hold plane 1-2 feet off surface in ground effect while dissipating airspeed
- Allow mains to touch down at MCA
- Power to IDLE, hold nose off runway
- No brakes – Don't stop on Runway!
- Use power safely as needed to make turn off

FORWARD SLIP (Touchdown Spot +400ft)

- Set flaps as desired **(>20˚ can result in elevator oscillations)**
- Determine wind direction, Power to idle
- Apply full rudder away from the wind
- Apply Aileron into the wind
- Maintain extended centerline
- Maintain airspeed via pitch attitude (ASI is not reliable during full forward slip)
- Once normal glideslope is attained, round out from slip and increase power to 1500rpm
- Complete the appropriate landing procedure.

GO-AROUND (BALKED LANDING) (AS +10/-5)

- Apply **Max Power**, Carb Heat **OFF**
- **Flaps 20˚ immediately**, Set climb pitch attitude
- Confirm Increasing AS (**Vx**), Positive ROC
- Flaps **10˚**, Accelerate
- Confirm Increasing AS (**Vy**), Positive ROC
- **Flaps 0˚, Climb out Vy – 76 KIAS**
- Sidestep runway (traffic) – declare a go-around
- Within 300' of TPA, turn crosswind

EMERGENCY APPROACH AND LANDING (AS ±10)

- Power to idle
- Pitch and trim for **BEST GLIDE 65 KIAS**
- Turn to suitable landing area
- Pre-Landing checks, Radio calls when conditions allow
- Lower flaps when landing area is assured
- Prepare for landing or Go-Around

SLOW FLIGHT (ALT ±100ft, HDG ±10˚, AS +10/-0), 15˚ Bank Turns ±10˚)

- Pre-Maneuver Checklist
- Carb Heat **ON**, Power to **1500 rpm**
- Maintain Altitude, Dissipate Airspeed
- Deploy flaps incrementally
- Approaching 55 KIAS, Power to 1800rpm
- Trim off pressures
- Pitch for Airspeed, Power for Altitude

RECOVERY

- Carb Heat Off, Max Power
- Flaps to 20˚, Increasing AS and aircraft control, then Flaps 10˚
- Maintain Altitude, Increase Airspeed, Flaps 0˚
- Continue straight and level flight, Establish Cruise

POWER-OFF STALL (HDG ±10˚, BANK ≤20˚±10˚)

- Pre-Maneuver Checklist
- Carb Heat **ON**, Power to **1500 rpm**
- Maintain Altitude, Dissipate Airspeed
- Deploy flaps incrementally
- At 70 KIAS, pitch down for **65 KIAS** and **400 fpm descent**, trim
- At designated altitude, power to idle, smoothly apply backpressure to bleed airspeed and pitch up for stall--place and hold nose on the horizon
- Ailerons = neutral, Rudder = directional control
- Announce Stall

RECOVERY

- Pitch Down, Max Power, Ailerons Neutral (wings level after stall is broken)
- Carb Heat **OFF**
- Pitch for Vy, Retract Flaps to 20˚
- Positive AS, Positive ROC
- Retract remaining flaps incrementally (+AS, +ROC)
- Climb Out **Vy – 76 KIAS**

POWER-ON STALL (HDG ±10˚, BANK 20˚±10˚)

- Pre-Maneuver Checklist
- Carb Heat **ON**, Power to **1500rpm**Maintain Altitude, Dissipate Airspeed
- @ **Vr – 55 KIAS**, Carb Heat Off, Max Power
- Pitch **Nose up** as necessary to induce stall
- Increase yoke back-pressure to maintain pitch attitude
- Ailerons Neutral, Rudder for directional control
- Announce Stall Indications

RECOVERY

- Release back pressure, Reduce Angle of Attack
- Apply Max Power
- Increasing AS, Positive ROC
- Climb out **Vy – 76 KIAS**

STEEP TURNS (ALT ±100ft, AS ±10, Bank ± 5˚, HDG ±10˚)

- Pre-Maneuver Checklist
- Perform below Va – 90-95 KIAS
- Establish Horizon Reference, Roll into 45˚ bank turn
- Passing 30˚ bank, add 200rpm and 1˚ nose up – TRIM
- Lead rollout 20-25˚, pause, make second turn in opposite direction
- Initiate rollout, Reduce power 200rpm, TRIM nose down

RECTANGULAR COURSE (ALT ±100ft, AS ±10˚)

- Pre-Maneuver Checklist
- Enter left or right downwind at 45˚ midfield
- Altitude 600-1000’ AGL, Cruise pitch/power – 2100rpm/85kt
- Bank no more than 30˚
- Turn to Crosswind – Steep/medium bank, >90˚ turn, crab into wind
- Turn to Upwind – Medium/shallow bank, <90˚ turn, no crab necessary
- Turn to Crosswind – Shallow/medium bank, <90˚ turn, crab into wind
- Turn to Downwind – Medium/Steep bank, >90˚ turn, no crab necessary
- Climb and Cruise checklist on departure

TURNS AROUND A POINT (ALT ±100ft, AS ±10)

- Pre-Maneuver Checklist
- Enter left or right downwind
- Altitude 600-1000’ AGL, Cruise power – 2100rpm
- Distance from object should result in no more than 30° Bank
- Bank no more than 30˚
- Select reference points at equal distances away from the object on the ground to fly between
- Maintain Constant Radius and Constant Altitude
- Increasing GS = Steeper Bank, Decreasing GS = Shallower Bank
- Climb and Cruise Checklist on Departure

S-TURNS ACROSS A ROAD (ALT ±100ft, AS ±10)

- Pre-Maneuver Checklist
- Enter left or right downwind
- Altitude 600-1000’ AGL, Cruise power – 2100rpm
- Upon crossing road, enter steepest bank (do not exceed 30˚)
- Shallow bank as the aircraft turns upwind
- Cross road again, wings level, parallel to road, in opposite direction
- Turn in opposite direction with shallow bank
- Steepen bank as aircraft turns downwind
- Increasing GS = Steeper Bank, Decreasing GS = Shallower Bank
- Depart on original heading
- Climb and Cruise Checklists on Departure



Civil Air Patrol

Colonel Roland Butler National Flight Academy

Flying Handbook

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COCKPIT SETUP

Student Seating

One of the most fundamental keys to the success of students at flight academy has been how the students are seated at the controls of their airplane. The most successful instructors at flight academy have found that their students must sit high enough to have good visibility over the nose of the airplane and close enough to reach the controls comfortably.

Students who are sitting too high in their seats perform better than those students who are sitting too low. Students who are sitting too low in their seats have more difficulty in maintaining a pitch attitude. Sitting too low also makes practicing the round-out and flare more difficult because the nose obscures the horizon and runway when it is raised. The student will lower the nose again to see the runway they are landing on which results in consistently poor landings.

Students must sit close enough to apply full rudder travel comfortably.

USE SEAT CUSHION(S) IF NECESSARY!

The Reference Mark (Grease Mark) on the Windshield

Another of the most fundamental keys to success of the students at flight academy has been the windshield reference mark. The mark on the windshield provides a much more exact reference than using the cowl or some other part on the nose of the airplane.

The grease spot reference should be about 8 inches above the bottom of the windshield plexiglas, or 3 inches above the eyebrow of the instrument panel.

If the grease spot is less than 3 inches above the instrument panel, the instructor must ensure the seat is articulated to its highest position and, if necessary, use a boat cushion under the student.

For proper training the student must sit high enough in their seat.

Instructor Action:



While holding the aircraft in a straight and level attitude, the instructor, sitting in an upright position, extends his arm and makes a reference mark on the windshield with the china marker.

Place the mark on the windshield to indicate the position of the horizon on the windshield when the instructor is sitting back in his seat in a normal position.

The most common error in creating the reference mark is to lean ahead while making the mark or to assume some other unusual seating position.

Student Action:



Now the instructor holds the aircraft in a straight and level attitude and keeps the windshield reference mark he made earlier on the horizon.
The student, sitting back in the seat in an upright manner, extends his arm and makes a reference mark on the windshield to indicate the position of the horizon.
To accurately create this mark, the instructor must insure the student is assuming his normal position at the controls.

The marks can be adjusted as needed if they are not found to be accurate as training progresses.

COLLISION AVOIDANCE

Scanning For Traffic

The primary responsibility for collision avoidance rests with the pilot. Learning collision avoidance procedures must begin with your first flight. Studies have shown that the majority of mid-air collisions occur within 5 miles of an airport, during daylight hours and in VFR conditions.

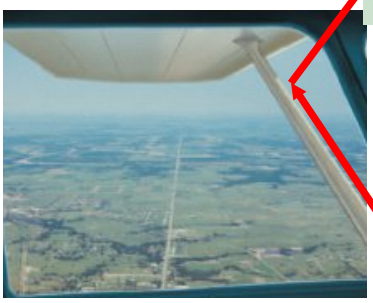
From the wing strut, scan into the windshield area.

Use short regularly spaced eye movements of no more than 10 degrees making sure you focus at least one second on each segment of the sky.
Make sure you scan both vertically and horizontally.

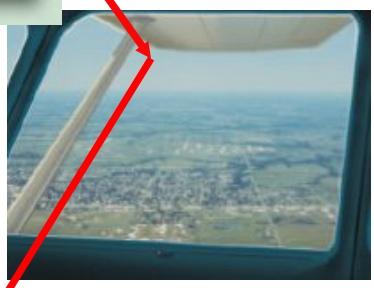


Scan across the windshield and down the wing strut to the cockpit making sure to focus on each 10 degree segment of the sky.

Be especially alert for traffic showing no motion but is getting larger. This indicates it is likely on a collision course with your airplane.



SEEING & AVOIDING IS THE PILOT'S MAIN RESPONSIBILITY. DEVELOP YOUR SCANNING SKILLS!!



After finishing the cockpit scan of the flight and engine instruments, scan out the pilot side window using the wing strut as a guide.

An airplane coming from the side has little relative motion unless there is a large speed difference and will be harder to see.



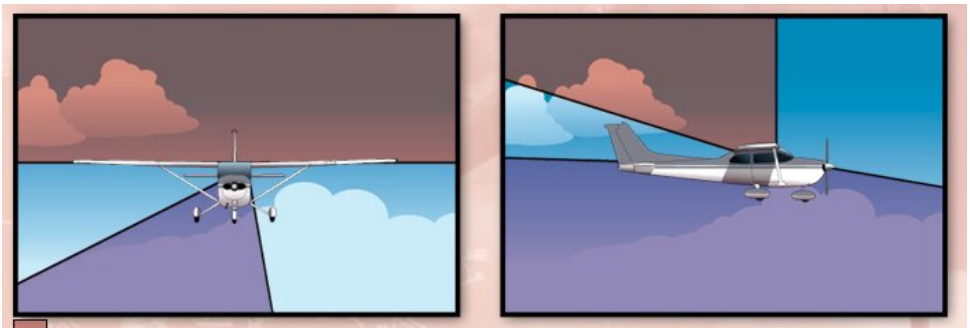
Scan into the cockpit and check radio frequencies.

Verify that the flight instruments are confirming that your visual references are correct and adjust the airplane as needed. Check that the engine instruments are indicating in the proper operating ranges.

Re-Start the scan up the strut.

Aircraft Blind Spots

In both high wing and low wing airplane designs portions of your view are blocked by the fuselage and wings making it difficult to see conflicting traffic. The blind spots for the Cessna 172 are indicated in the diagram below.



Magenta Areas:

The upper magenta parts of the diagram indicate the blind spots created by the wings of the C-172

Purple Areas:

The lower purple areas of the diagram indicate the blind spots created by the fuselage of the C-172.

Clearing Turns

Clearing Turns **two 90 degree turns, left then right,** before starting a practice maneuver. Theses **turns allow the pilot to see areas blocked by the wings and the fuselage of the airplane** and make it easier to maintain visual contact with other aircraft in neighboring practice areas.

Before starting any maneuvers in the practice area, you need to make clearing turns and carefully scan the practice area for other aircraft! The US Air Force teaches CHEF-Clear as a pre-maneuver checklist. Cockpit, Harness, Engine Instruments, Fuel and Clearing turns.

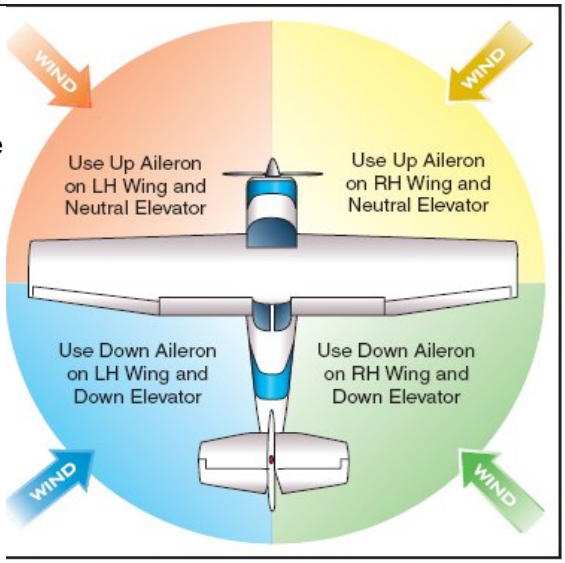
GROUND (TAXI) OPERATIONS

Taxiing is the controlled movement of the airplane under its own power while on the ground.

The pilot must be aware of the entire area around the aircraft to ensure that the airplane will clear all obstructions and other aircraft.

CAP regulations state that the pilot must bring the aircraft to a complete halt anytime you are within 10 ft of an object before proceeding on. Students will keep one hand on the throttle and one hand on the yoke during all ground operations.

Avoid gripping the controls too tightly. Stay Loose!



gure 2-10. Flight control positions during taxi.

Requirements for Safe Taxi:
1) Positive control
2) Ability to see potential hazards in time to avoid them.
3) Ability to stop or turn without relying on the brakes too heavily.

While it is difficult to set a single safe taxiing speed, you should be slow enough so when the throttle is closed the airplane can be stopped promptly.

When yellow taxiway center-line stripes are provided, they should be followed unless it becomes necessary to avoid other aircraft or obstructions.

Steering is done with rudder pedals and brakes, not the control yoke!

Because moderate to strong winds or jet blast can cause a loss of control or even overturn your aircraft, proper use of the ailerons and elevator will help you control the aircraft while taxiing.

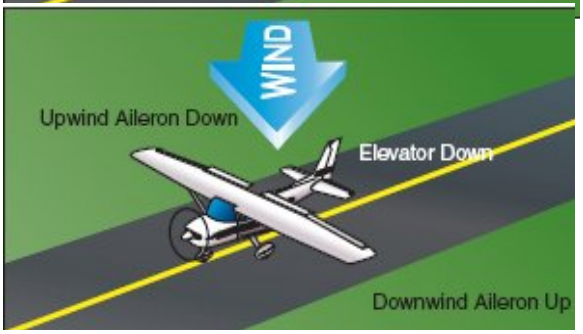
Climb and Turn Toward (Into) a Headwind

When taxiing into a quartering headwind, the wing on the Upwind side will tend to rise unless you turn the control wheel in the direction the wind is blowing from (upwind aileron up). Moving the upwind aileron up reduces the impact of the wind striking underneath the wing. The control movement also causes the downwind aileron to go down, increasing lift on the wing and further reducing the tendency of the upwind wing to rise. Hold the elevator neutral or back slightly (in a climb position).



Dive and Turn Away from a Tailwind

When taxiing with a right quartering tailwind, keep the control wheel forward (in a dive) and turn the control wheel to left (turn away from the direction the wind is blowing from). Since the wind is striking from behind, the force of the wind is reduced under the upwind aileron and wing, and the elevator position keeps the tail down.



Use of the Brakes While Taxiing

It is a common student error to taxi with a power setting that requires controlling taxi speed with the use of the brakes. This is like driving your car with one foot on the brakes and the other foot on the gas pedal. Rather than continuously riding the brakes to control speed, it is better to apply brakes only occasionally and use the throttle to control your speed. Since the brakes are on the top of the rudder pedal, the best way to avoid the brakes is to keep your heels on the cockpit floor when you are taxiing.

Normally, all turns should be started using the rudder pedal to steer the nose-wheel. To tighten the turn after full pedal deflection is reached, the brake may be applied as needed. When stopping the aircraft, it is always advisable to stop with the nose-wheel straight ahead to relieve any side loads on the nose-wheel, making it easier to start moving ahead again.

Instructor Emphasis Items

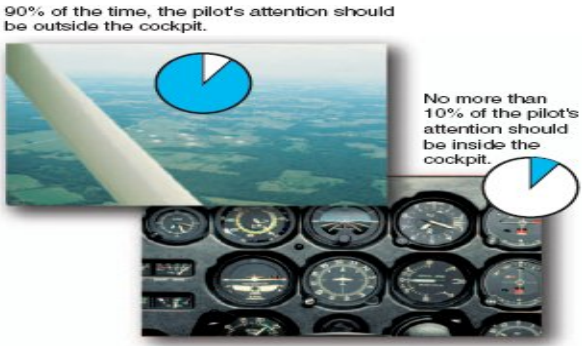
INSIST THAT THE STUDENT KEEP ONE HAND ON THE THROTTLE DURING GROUND OPERATION (INCLUDING RUN-UP), DURING CLIMBS AND DURING LOW ALTITUDE SITUATIONS.

MONITOR A SAFE TAXI SPEED. INSIST ONE HAND ONLY BE ON THE YOKE. USE A LIGHT GRIP AVOID "CHOKING" THE YOKE.

THE FOUR FUNDAMENTALS OF FLIGHT

The Horizon as a Visual Reference

The airplane's attitude is established and maintained by positioning the airplane in relation to the natural horizon. The airplane's attitude is confirmed and re-checked by referring to the flight instruments in the cockpit. Continuous checks and immediate corrections will allow little chance for the airplane to deviate from its flightpath. The pilot must become familiar with the relationship between the outside references to the natural horizon and corresponding indications on the flight instruments inside the cockpit.



1. Straight & Level
2. Turns
3. Climbs
4. Descents

All flight maneuvers are made up of combinations of the four fundamentals of flight. Proficiency in these basic maneuvers will make the next more advanced steps of your training much easier to achieve. Each time you fly, your position in the aircraft should be the same. Your instructor will help you determine the position of the seat that is correct for you. Your instructor will also help you place a mark on the windscreen of the aircraft that will be a reference point to make learning and doing the maneuvers much faster and easier.

Straight and Level Flight

To maintain straight and level flight there are three main reference points that you will use; 1) equal distances between the bottom of the wings and the horizon; 2) the grease spot on the windscreen is on the horizon.

Bank (Roll) for Turns

To maintain equal distances between the bottom of the wings and the earth's horizon, the control wheel is rotated to the right or left. Rotating the control wheel toward a wing raises that aileron,causing the wing to go down. At the same time, the other wing's aileron goes down causing the wing to go up. This movement, called roll, describes movement around the aircraft's longitudinal axis which runs from prop spinner to tail.



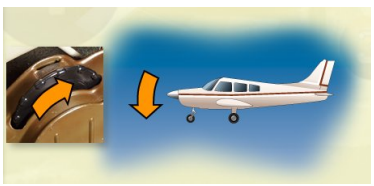
Pitch for Climbs and Descents

When forward pressure is placed on the control wheel, the grease spot on the windscreen moves below the horizon; when back pressure is applied to the control wheel, the grease spot on the windscreen moves above the horizon. The rotation is around the lateral axis, an imaginary line which runs from wingtip to wingtip through the center of gravity. Rotation around the lateral axis is called pitch attitude and is controlled by the elevator surfaces on the aircraft. Control of the aircraft pitch attitude around the lateral axis to achieve level, climbing or descending flight can easily be maintained by keeping the grease spot on the windscreen in a fixed position relative to the earth's horizon.

Trim Control

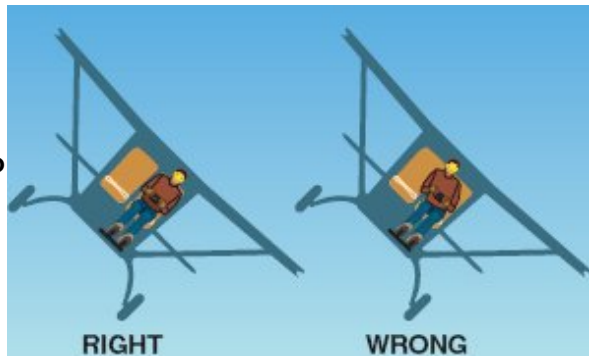
An improperly trimmed airplane requires constant control inputs, produces pilot tension and fatigue, distracts the pilot from scanning and contributes to abrupt and erratic attitude control. Once a constant airspeed /pitch attitude has been established, the pilot should hold the grease spot on the horizon with the control yoke and roll the trim wheel to remove the pressure the pilot feels on his hand from the control yoke. The aircraft will then maintain the desired pitch attitude and fly "hands off". A properly trimmed airplane is an indication of good piloting skills.





THE FOUR FUNDAMENTALS OF FLIGHT
Turns

A turn is a basic maneuver used to change the direction of the aircraft. Turns involve the close coordination of all three flight controls – ailerons, rudder and elevator. The ailerons bank the wings and determine the rate of turn. The elevators move the nose of the airplane up or down in relation to the pilot and perpendicular to the wings which sets both the pitch attitude in the turn and pulls the nose of the airplane around the turn. The rudder offsets any yaw effects developed by the other controls. **The rudder does not turn the airplane!**



Posture

Your posture while seated in the aircraft is very Important during all of the maneuvers you will perform. **Sit erect and don't lean from side to side during the turns.** If you don't maintain a constant position in the cockpit, your outside references will continually change and the maneuvers will be much harder to learn.

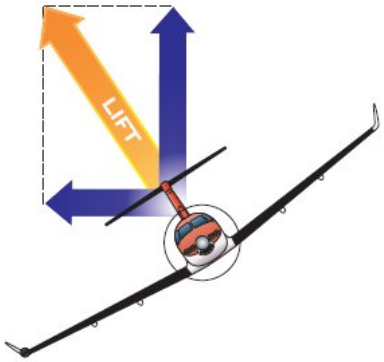
Shallow, Medium and Steep Turns

Turns are usually divided into three classes depending on the amount of bank used: 1) Shallow – less than 20 degrees of bank, 2) Medium – 20-45 degrees of bank, 3) Steep – 45 degrees or more of bank.

In shallow and medium banked turns, the pi
As the airplane is banked into a turn, lift becomes the result of two components; Vertical lift which opposes gravity and horizontal lift
which opposes centrifugal force (inertia).
It is the horizontal lift

the amount of pressure that is applied. You
which turns the airplane - not the

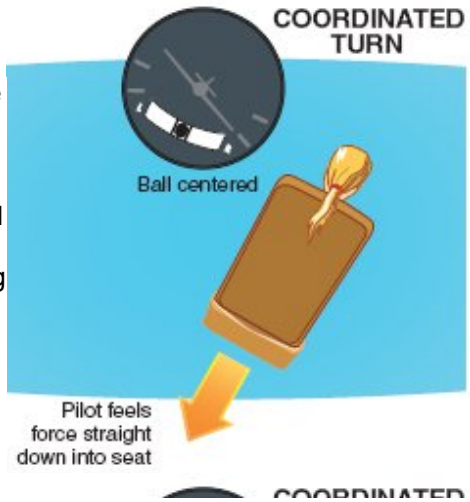
will hold the control pressures until the desired



In shallow turns the pitch attitude is slight but as the bank angle increases, pitch attitude is much more pronounced.
To turn the airplane; Apply pressure to the rudder and the ailerons at the same time. The rate at which the airplane rolls depends upon how much pressure is applied to the controls. Hold a constant pressure on the controls until you get the desired angle of bank needed then neutralize the controls. Since the aircraft will turn as long as there is any bank, start the rollout before reaching the desired heading.

Coordinated Turns

When you apply aileron pressure to bank the airplane, the aileron on the rising wing produces a greater drag than the aileron on the lowered wing. The increased lift from the rising wing also produces increased induced drag (drag created by lift) which yaws (turns) the airplane towards the rising wing which is opposite to the direction of the turn.



To overcome this adverse yawing motion, rudder pressure must be applied together with the aileron in the desired direction of the turn. Use the rudder as long as the ailerons are deflected. The correct amount of pressure depends on aircraft speed and the amount of aileron used. By keeping the ball centered in the turn coordinator you will know you are using the correct amount of rudder.

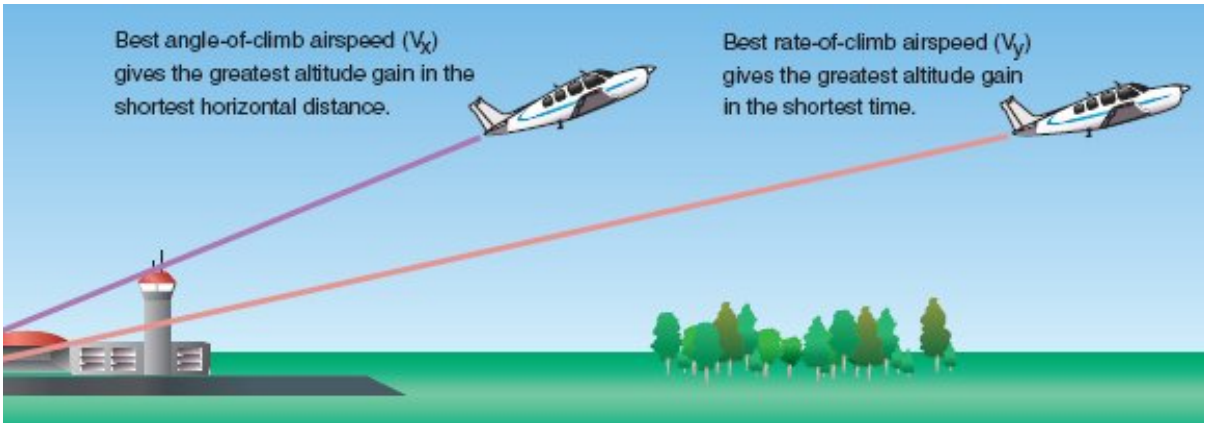
Instructor's Emphasis Items

MONITOR COORDINATION CONSTANTLY; INSIST ON RUDDER & AILERON TOGETHER ROLLING IN & OUT OF TURNS !!! BACK PRESSURE MUST BE ADDED IN ALL TURNS WHETHER LEVEL, DESCENDING OR CLIMBING. ERRORS WILL SHOW UP IN THE TRAFFIC PATTERN AS TOO HIGH AIRSPEED CLIMBS AND DESCENTS.

THE FOUR FUNDAMENTALS OF FLIGHT

Climbs

A climb is a maneuver executed to gain altitude in a safe, orderly manner. Like other maneuvers, climbs should be performed using outside visual references with the flight instruments as a back up. In a climb, weight acts in a rearward direction causing an increase in total drag. The increased drag requires an increased thrust to offset the drag so the forces will be balanced again. An airplane's ability to climb is limited by the available thrust.



NORMAL (CRUISE) CLIMB

Cruise climb airspeed is generally higher than the airplane's best rate of climb.
Cruise climb airspeeds provide:

1) Better engine cooling
2) Better visibility over the nose
3) Easier aircraft control

The reference spot on the windshield is held 2-3 inches above the horizon.

BEST RATE OF CLIMB (Vy)

The best rate of climb airspeed is where the most excess power is available over what is needed for level flight. This condition of flight produces the most altitude gain in the least amount of time **(max. rate of climb in feet per minute).**

The reference spot on the windshield is held 3-5 inches above the horizon.

BEST ANGLE OF CLIMB (Vx)

The best angle of climb produces the most altitude gain in a given distance.
The best angle of climb airspeed:

1) Used to clear obstacles after take-off.
2) Results in a steeper climb path
3) Is a considerably lower airspeed than Vy

The reference spot on the windshield is held 8-12 inches above the horizon.

CLIMB & LEVEL OFF PROCEDURES

TO ENTER A CLIMB:

1) Gently raise the spot on the windshield to approx. 3 in. above the horizon (an attitude that should produce Vy at full power).
2) As the airspeed slows to 5 kts above Vy, add full engine power.
3) When the power is increased, the aircraft nose will tend to rise and turn to the left, so **right rudder must be added to keep the ball centered** in the turn coordinator and keep the same heading.
4) Re-Trim the airplane to relieve control pressures

TO LEVEL OFF FROM A CLIMB:

1) Start the level-off at 10% of the rate of climb. (A 500 ft/min climb should start the level-off 50 ft below the desired altitude).
2) Gradually lower the nose of the airplane until the spot on the windshield is on the horizon.
3) When the airplane gets almost to cruise airspeed, start reducing the power to cruise setting from full power.
4) Re-trim the airplane to hands-off level flight.



Instructor Emphasis Items

DURING CLIMBS & LEVEL OFFS:

Use Vy and full power for all normal climbs.
The spot on the windshield will be approx. 3 inches above the horizon.
Constantly monitor climbs for proper right rudder use!!!
Insist that students keep one hand on the throttle during climbs.
Students should put the spot on the horizon and leave full power on during level off until cruise speed is reached.
Trim must be used to relieve yoke pressure as the aircraft speeds up.

THE FOUR FUNDAMENTALS OF FLIGHT

Descents

Cruise (Enroute) Descent

- Descent using partial power.
- Target descent rate should be 400- 500 feet per minute.
- Airspeed may vary from cruise airspeed to the airspeed used on the downwind leg of the landing pattern.
- Airspeed, pitch and power should be pre-selected and kept constant

Descent at Minimum Safe Airspeed

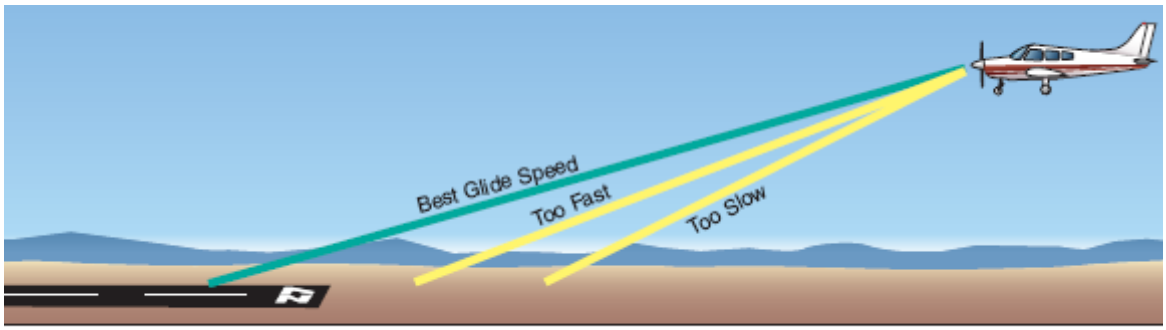
- Principally used for clearing obstacles while landing on a short runway.
- Airspeed used is recommended by the airplane maker – no greater than 1.3 Vso.
- A steeper than normal descent rate.

Glides

- The airplane loses altitude in a controlled descent with little or no engine power.
- Used in normal landing Approaches and in forced landings after engine failure.
- Forward motion maintained by gravity.
- Pilot adjusted pitch attitude controls airspeed.

GLIDES

Since portions of the normal landing approach make use of glides and the student needs to develop an ability to judge gliding distance, you must practice glides and gliding turns. The application of controls is somewhat different in glides than in power-on descents. The difference is caused by two factors: 1) The absence of a propeller slipstream over the horizontal stabilizer and, 2) The difference in effectiveness of the control surfaces at slower airspeeds. Since power is not used during a glide or power-off approach, the spot on the windscreen (pitch attitude) must be adjusted to maintain a constant airspeed.



Best glide speed provides the greatest forward distance for a given loss of altitude.

Best Glide Speed

- Speed at which the airplane will travel the greatest forward distance for a given loss of altitude in still air.
- Lets the pilot judge landing areas accurately

Gliding Too Fast

- Increased parasite drag degrades distance.
- Results in floating over the runway for varying distances before landing, overshooting the runway.

Gliding Too Slow

- Increased induced drag degrades distance.
- Results in landing short of runway, a flatter approach to landing and hard touchdowns.

Glide Procedures

Glide Entry:

- Reduce throttle to idle
- Keep the windshield spot on the horizon (maintain level flight attitude) until glidespeed is reached.
- Lower the windshield spot below the horizon (adjust the pitch attitude) to establish the desired glide speed and check the airspeed indicator to confirm airspeed.
- Trim the aircraft to maintain airspeed.

Notes:

- A glide with flaps allows you to descend at a faster rate and at a steeper angle without increasing air-speed.
- Remember to maintain proper rudder inputs for coordinated flight when airspeed and power changes are made.

changes are made

Level-Off From a Glide:

- When the aircraft is approx. 10% of the descent rate (10% of a 500 ft/min descent rate is 50 ft) above the target altitude, raise the windshield spot to the horizon (to level flight attitude).
- At the same time, add full power to return to cruise flight (keep spot on the horizon).
- Reduce the power to cruise setting and trim to maintain level cruise flight.

Instructor Emphasis Items

THE STUDENT MUST USE THE WINDSHIELDSPOT BY RELATING ITS DISTANCE ABOVE OR BELOW THE HORIZON TO DETERMINE THE AIRSPEED IN VARIOUS CONFIGURATIONS. THE WINDSHIELDSPOT WILL ELIMINATE THE NEED TO WATCH THE AIRSPEED INDICATOR CONSTANTLY.

STEEP TURNS

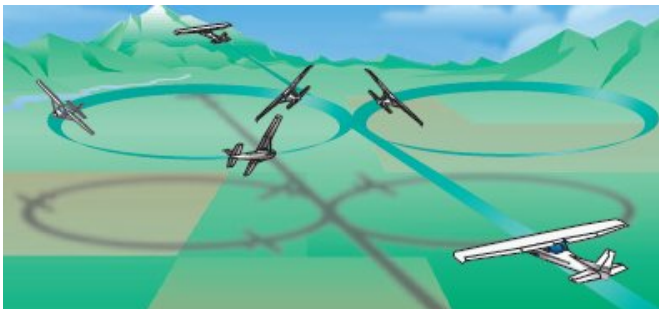
What is a Steep Turn

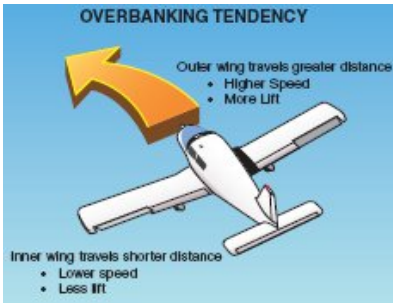
A steep turn consists of a turn in either direction, using a bank angle between 45 to 60 degrees . This will cause an overbanking tendency during which maximum turning performance is gotten and high load factors are imposed. Because of the load factors, these turns should not be performed at an airspeed that does not exceed the design maneuvering speed (Va).

Objectives of Steep Turns

Students who practice steep turns will develop the smoothness, coordination, orientation and division of attention, and control techniques necessary to make maximum performance turns when the airplane is near performance limits.

Steep Turns should be continued until 360 or 720 degrees of turn have been completed. An airplane's maximum turning performance is its fastest rate of turn and its shortest radius of turn. An airplane's turning performance is limited by engine power, structural strength, and its aerodynamics.
In all constant altitude, constant airspeed turns, it is necessary to increase the angle of attack of the wing (raise the nose of the airplane) when rolling into the turn by applying up elevator. This is required because a part of the vertical lift has been diverted to horizontal lift.





OVERBANKING TENDENCY: The problem with Steep Turns

When the pilot changes from a shallow turn to a steep turn, the speed of the wing on the outside of the turn becomes much faster than the speed of the wing on the inside of the turn. Since the outside wing is traveling faster, it creates more lift on that wing.

More lift on the wing causes:
1) **Overbanking tendency (the turn will get steeper) – this is controlled by using more ailerons.**
2) **More lift causes more induced drag (a slight slip) – this is controlled by using more rudder.**

Sometimes in early training in steep turns, the student may allow the nose of the airplane to get excessively low which results in a large altitude loss. To recover, the student must first shallow the bank using both rudder and ailerons and then raise the nose of the airplane to level flight with the elevator. If recovery is attempted with elevators alone, the bank will steepen and the added forces can overstress the airplane.

Method of Making a Steep Turn

To establish the desired angle of bank in the steep turn, the student should use visual reference points outside the airplane.



1) **Start the steep turns from slow cruise speed (approx 95 kts). Add 100-300 RPM of power after rolling past 30 degrees of bank.**
2) **At 30 degrees of bank, start raising the grease spot until it is about two inches above the horizon.**
3) **Roll in and out slowly. Use 45 degrees of the turn to complete the roll in and 45 degrees of the turn to roll out.**
4) **G forces must be felt pushing us down into the seat or the turn is too shallow and the nose of the airplane is below the spot.**
5) **45 degrees before completing the circle, begin lowering the nose and reducing the bank. Reduce the power when the bank is rolling out past 30 degrees.**
6) **Constantly monitor that the grease spot remains in place. This assures adequate back pressure.**

Instructor Emphasis Items

DEMONSTRATE THIS MANEVER FIRST TURNING TO THE LEFT AND THEN TO THE RIGHT. MAKE CERTAIN TO POINT OUT TO THE STUDENT WHERE HE/SHE SEES THEIR SPOT ON EACH DIRECTION OF TURN.

SLOW FLIGHT & MINIMUM CONTROLLABLE AIRSPEED

SLOW FLIGHT

Pilots must learn the flight characteristics of their aircraft in all portions of the flight envelope. Slow flight can be thought of as any speed that is less than cruise flight speed. **The objective of maneuvering during slow flight is** to develop the pilot's ability to use the controls correctly and become proficient in maneuvers that require slow air speeds.

In pilot training slow flight is broken down into two separate divisions;

1) establishing, maintaining and maneuvering the aircraft at air speeds and configurations needed for take-offs, climbs, descents, landing approaches and go-arounds.
2) maneuvering at the slowest air speeds that the airplane is capable of without stall indications – usually 3-5 knots above stall speed.



TRANSITION TO SLOW FLIGHT:

1) To begin the maneuver, the throttle is reduced from the cruise power setting.
2) As the airspeed decreases, the spot on the windshield should be raised above the horizon as necessary to maintain altitude.
3) As the airspeed decreases, the flight controls will become less responsive and larger control movements become necessary to maneuver the airplane.
4) Re-trim the airplane as necessary to correct changes in control pressures.
5) Cross-check airspeed, altimeter, heading indicator & attitude indicator as well as the outside references (windshield spot) to maintain accurate control of the airplane.

MINIMUM CONTROLLABLE AIRSPEED

"Flight at Minimum controllable airspeed" means a speed at which any further increase in angle of attack or load factor or reduction in power will cause an immediate stall. **Minimum Controllable airspeed demonstrates** the changes in the handling characteristics of the aircraft at its minimum flight speed and prepares the student for the techniques and positive aircraft control that will be needed for future take-off and landing practice.

Students practicing this maneuver will learn:

1) Precise airspeed and altitude control,
2) the effect of high power at low air speeds, and
3) techniques for operating the aircraft in the area of reverse command (behind the power curve).

When practicing minimum controllable airspeed and slow flight, the student will notice the constant pressure needed on the right rudder control to offset the effects of the airplane's left turning tendencies which become very apparent at high angles of attack and high power settings.

Instructor's Emphasis Items

STUDENTS MUST LIMIT CLIMBING TURNS TO STANDARD RATE. HAVE THE STUDENT ESTABLISH THE PROPER BANK ANGLE USING OUTSIDE REFERENCES (THE SPOT ON THE WINDSHIELD), THEN VERIFY TURN RATE WITH THE TURN COORDINATOR.

SLOW FLIGHT:

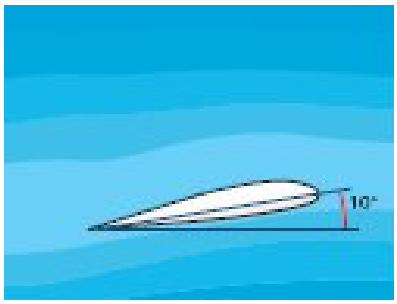
CONSTANTLY MONITOR SLOW FLIGHT & CLIMBS FOR PROPER RIGHT RUDDER USE

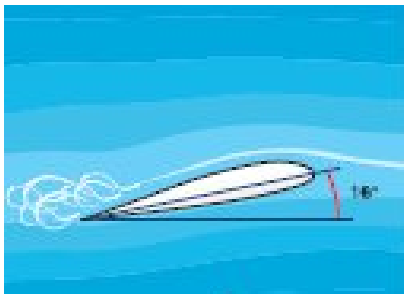
GLIDES:

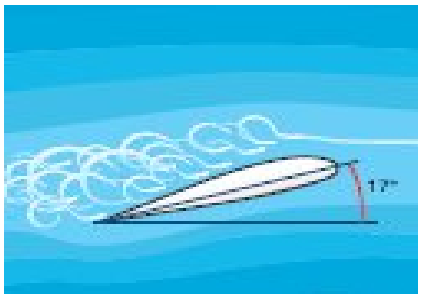
THE STUDENT SHOULD UNDERSTAND THAT, FOR A GIVEN AIRSPEED, THE NOSE MUST BE HIGHER WITHOUT FLAPS THAN WITH FLAPS. THIS IS BECAUSE FLAPS ACHIEVE A HIGH ANGLE OF ATTACK WITH LESS PITCH ATTITUDE.

STALLS

Pilots must recognize the flight conditions that can produce stalls and they must know how to apply the necessary corrective action. The practice of stall recovery and the development of awareness of stalls are of primary importance in pilot training. **The objectives in performing intentional stalls are;** 1) to familiarize the pilot with the conditions that produce stalls, 2) to assist in recognizing an approaching stall, and 3) to develop the habit of taking prompt preventative or corrective action when a stall occurs.







A stall occurs when the smooth airflow over the wing is disrupted, and lift degenerates rapidly. Stalls occur when the wing exceeds the critical angle of attack. Stalls can occur at any airspeed, in any attitude and with any power setting.

Stall Recognition

When the student practices intentional stalls, <u>it is not</u> to learn how to stall the airplane.
The student should be learning how to recognize an approaching stall and how to take prompt corrective action to prevent it.



<u>Stall Recognition Signals in the Cockpit</u>

Vision – See the spot on the windscreen unusually high above the horizon (indicating a nose high attitude).
Hearing - Decreasing wind noises around the airplane as the airspeed slows. Engine sounds decrease as the airplane slows.
Control - As speed lessens, resistance to pressures on the controls **Pressure** becomes less and the lag time between control movements and airplane responses become greater until, at full stall, controls can be moved with no resistance.
Feel - Just before the stall occurs; buffeting pitch changes & vibrations may begin.

Fundamentals of Stall Recovery



1) LOWER THE NOSE
Since the basic cause of a stall is an excessive angle of attack, the cause must be removed by releasing the back elevator pressure that was needed to hold that angle of attack. Reducing the angle of attack is the only way of recovering from a stall regardless of the amount of power used.
2) ADD FULL POWER
Prompt & smooth application of maximum allowable power. Full power helps to increase the airplane's airspeed and assists in reducing the wing's angle of attack.
3) REGAIN STRAIGHT & LEVEL FLIGHT
Apply coordinated use of all flight controls to regain level flight.

Imminent Stalls

An imminent stall is one in which the airplane is approaching a stall but is not allowed to completely stall. These stalls may be entered and performed with the same configurations and attitudes as full stalls but, instead of allowing a complete stall, when the first buffeting or decay of control effectiveness is noted, the angle of attack must be reduced and power applied as needed. This stall maneuver is primarily for practice in keeping (or regaining) full control of the airplane immediately upon recognizing that a stall is likely to occur if timely, preventative action is not taken.

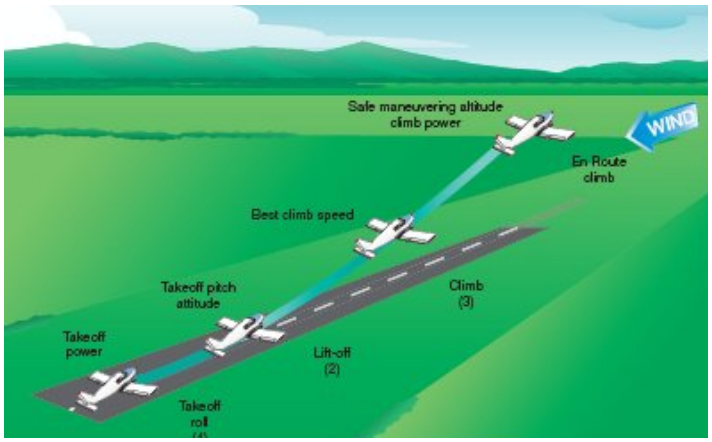
Instructor Emphasis Items

TEACH "POWER UP, NOSE UP, FLAPS UP" FOR RECOVERY FROM STALLS AND FOR GO-AROUNDS.

NORMAL TAKEOFFS

A NORMAL TAKE-OFF IS WHEN:

1) The airplane is headed into a wind that is nearly aligned with the runway .
2) The takeoff surface is firm and of sufficient length.
3) There are no obstructions along the takeoff path.



1) TAKEOFF ROLL:

A) The airplane should be aligned on the runway centerline with the nosewheel straight or centered.
B) Advance the throttle smoothly to takeoff power. An abrupt power application may cause the airplane to yaw sharply left because of torque effects from the engine and propeller.
C) **Pilot has both heels on the floor so the toes are on the rudder pedals – NOT THE BRAKES!!!**
D) Monitor engine instruments for any malfunctions.
E) Maintain directional control with smooth rudder corrections since torque and P-factor will tend to pull the nose of the airplane to the left.

Establishing a Proper Takeoff Attitude



2) LIFTOFF: A good takeoff depends on the proper takeoff attitude!

Rotation (Establishing Takeoff Attitude)
As the airplane gains speed and the flight controls become more effective during the takeoff roll, the pilot gradually adds back elevator pressure to raise the nosewheel of the airplane slightly off the runway.

The position of the nose (the spot on the windshield) in relation to the horizon should be noted and elevator pressure applied as needed to hold that attitude. The airplane is allowed to fly off the ground while in this attitude.

As the airplane leaves the ground, the pilot must look outside the airplane to maintain the proper bank angle (wings level) as well as the proper pitch attitude rather than concentrate on the flight instruments.

3) CLIMBOUT:

The airplane will pick up speed rapidly after takeoff since it should be flying at the pitch attitude that will allow it to accelerate to V_y, the speed at which the airplane will gain the most altitude in the shortest time. The pilot will make slight pitch changes using the elevators while using the spot on the windshield and the horizon for reference and then crosscheck the airspeed indicator for verification.

The airspeed indicator should be used only as a check to determine if the attitude is correct.

Proper trim settings will make it easier to hold a constant attitude and airspeed during climbout. Takeoff power should be maintained until the airplane has reached at least 500 ft. above the ground.



It i drifting into obstructions or the path of another airplane taking off from a parallel runway.

Careful scanning techniques are critical to a safe takeoff and climb, not only for maintaining attitude and direction, but also for collision avoidance in the crowded airport environment!!



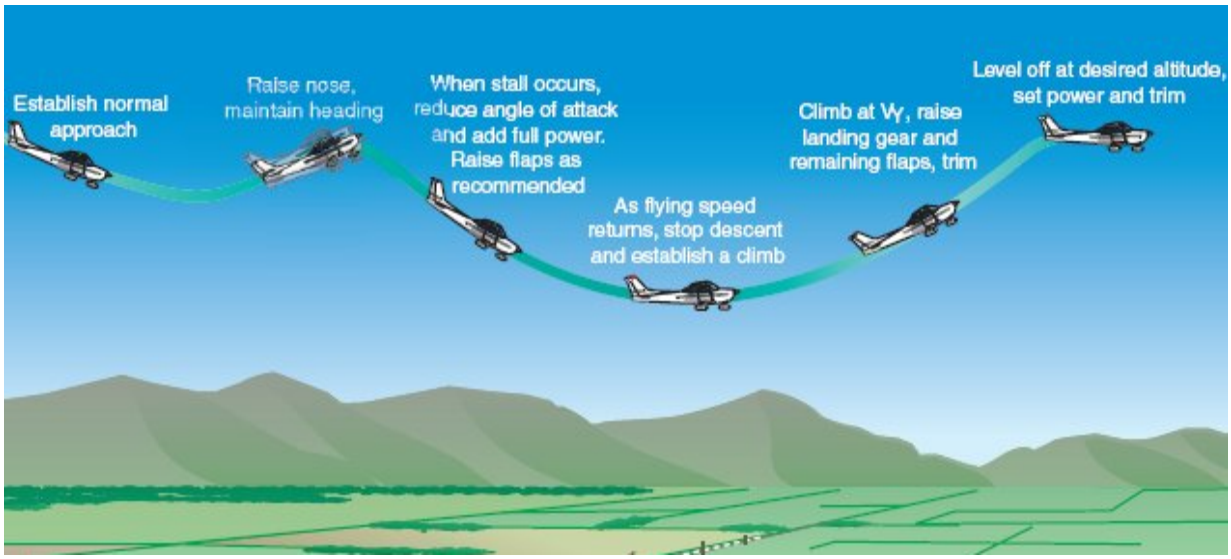
No Wind - No Drift

With any wind, the airplane drifts downwind unless corrected.

With proper correction, airplane stays on intended course.

(APPROACH TO LANDING STALLS)

Power-off stalls are usually performed to simulate an accidental stall which would occur during a landing approach. Recovery from power-off stalls should also be practiced from shallow banked turns simulating a stall during a turn from base leg to final approach.



Power-Off Stall Recognition







Starting the stall, raise the spot to the horizon and hold it there. That will gently induce the stall. The stall will feel like a gentle shake (buffet) and the spot will lower itself to about 1-2 inches below the horizon.

Power-Off Stall Recovery



1) Apply Full Power



2) Shut Off Carb. Heat



3) Apply Right Rudder

The nose of the airplane will move to the left and raise to the horizon when full power is applied. Hold the spot on the horizon with the elevator and apply rudder to stop left yaw.



4) Raise the Flaps

POWER UP!!

NOSE UP!!

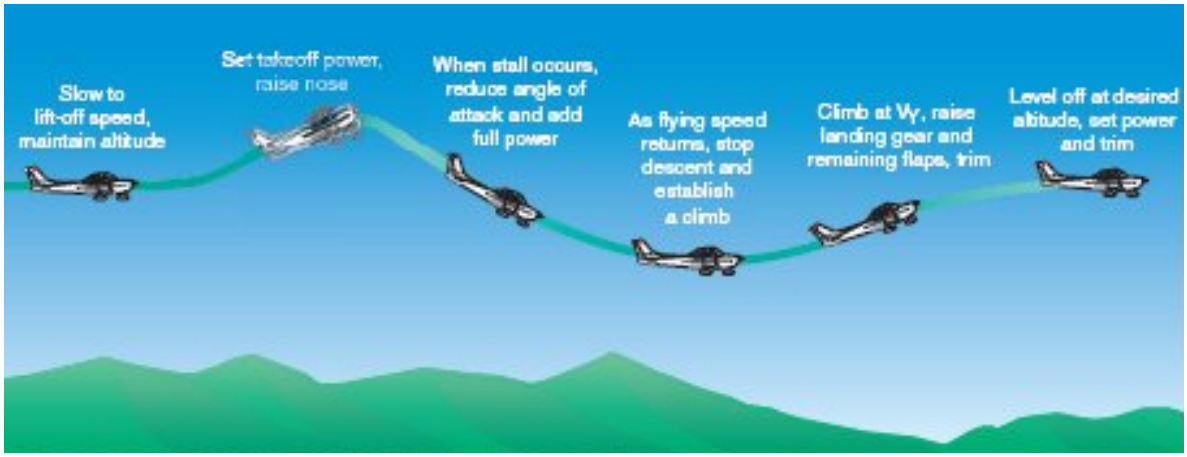
FLAPS UP!!

Instructors Emphasis Items

INTRODUCE POWER OFF STALLS DURING MINIMUM CONTROLLABLE AIRSPEED BY ALLOWING THE WING TO GENTLY "NIBBLE" AT A STALL AS A RESULT OF EXCESSIVE PITCH.

POWER ON STALLS
(DEPARTURE STALLS)

Power-on stalls simulate an accidental stall most frequently occurring shortly after takeoff. This stall can happen if the pilot attempts to lift off and climb out at an airspeed below the normal takeoff speed or if the pilot establishes an excessively high pitch attitude during the initial stage of climb out.



Stall Recognition

The area is cleared as the airplane is slowed to lift off speed while maintaining a constant altitude. As lift off speed is reached, back pressure is added to increase the angle of attack, and full power is applied. Right rudder pressure is increased as power and pitch are increased to maintain directional control and coordination.

The noise of the slipstream passing over the airplane deceases while the engine noise becomes more labored. The flight controls become more sluggish as the spot on the windshield now is over 6 inches above the horizon.







Stall Recovery

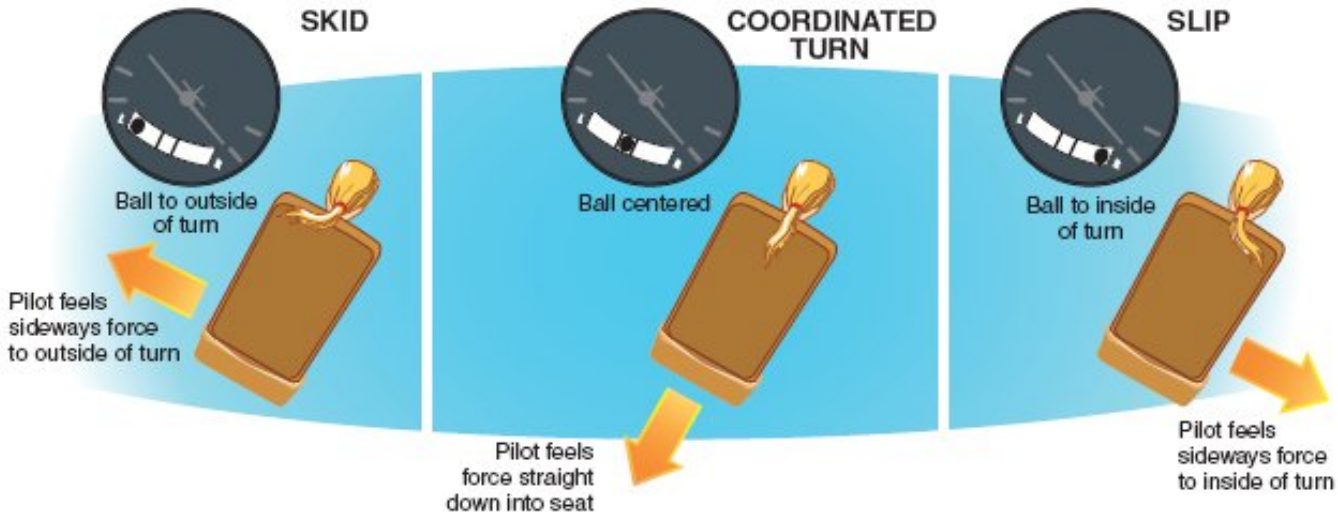
The recovery from the stall consists of reducing the angle of attack (putting the windshield reference spot back on the horizon), adding full power (if not already at full power), and using coordinated control pressures to return the airplane to straight and level flight.








Slips and Skids



A skid occurs when the aircraft slides sideways away from the center of the turn. The skid is caused by too much rudder pressure in relation to the aileron pressure used in establishing the turn. If you increase the rate of turn by use of the rudder without increasing the angle of bank, the aircraft will skid sideways away from the center of the turn. Skids also occur in level flight if the nose of the aircraft is rotated sideways around the vertical axis.

Unintentional slips are most often the result of uncoordinated rudder/aileron applications!!!

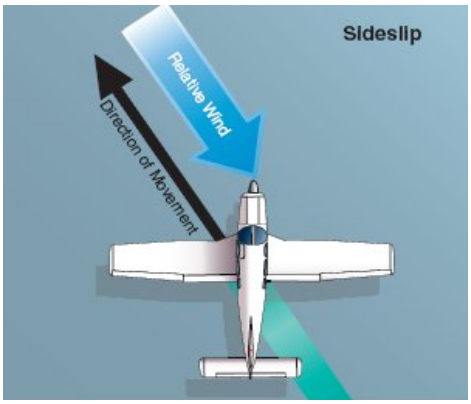
The ball is not "centered". The pilot can correct the skid/ Slip by "Stepping on the Ball"

A slip occurs when the aircraft slides sideways and downward toward the center of the turn. A slip is caused by too small amounts of rudder pressure in relation to the amount of aileron pressure used when establishing a turn.

If you roll into a turn applying more aileron than rudder, the aircraft will slip sideways and downward toward the center of the turn and lose altitude.

INTENTIONAL SLIPS

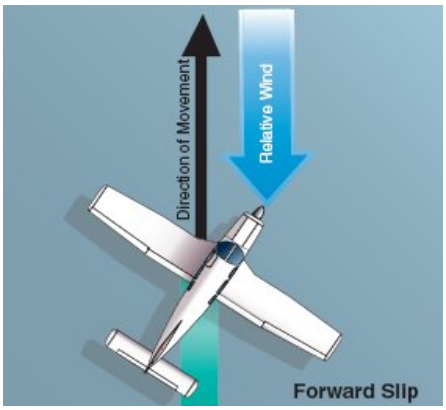
A slip is a combination of both forward and sideward movement of an aircraft. Since an airplane in a slip is, in fact, flying sideways, this results in a change in the direction the relative wind strikes the airplane. Slips are characterized by a marked increase in drag caused by the relative wind striking the side of the fuselage during the slip.



Intentional Slips

1) Lose altitude without increasing Airspeed.
2) Adjusting an airplane ground track During a crosswind.
3) Rapidly losing airspeed where wing Flaps are not installed or inoperative.
4) Clearing obstacles during approachesTo confined areas.

Because of the location of the pitot tube and the static ports, airspeed indicators in some airplanes may have a large error when the airplane is in a slip.



Enter a sideslip by lowering a wing and applying just enough opposite rudder to prevent a turn.
The horizontal component of lift forces the airplane to move sideways toward the lowered wing.
The amount of slip, and the sideward movement, is determined by the bank angle; steeper bank – more slip. As bank angle steepens, more opposite rudder is needed to prevent a turn from occurring.

In the forward slip, the airplane's direction of movement continues the same as before the slip was begun.
The wing on the side toward the slip is lowered and the airplane's nose is yawed in the opposite direction from the bank to maintain the original ground track.
The amount of the slip, as well as the sink rate, is determined by the bank angle. The steeper the bank – the steeper the descent rate.

GROUND REFERENCE MANEUVERS

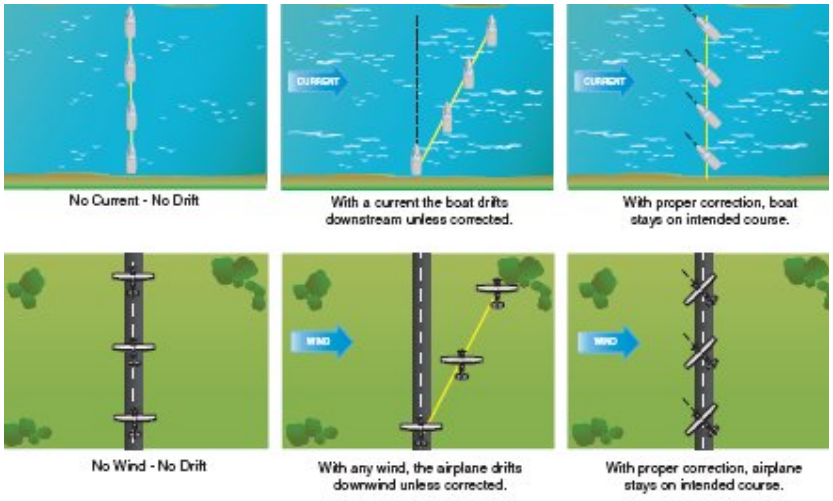
What is the Purpose of Ground Reference Maneuvers?

Ground reference maneuvers are used to develop a high degree of pilot skill. They aid the pilot in developing control touch, coordination, and the division of attention necessary for accurate and safe maneuvering of the airplane. The early part of pilot training is conducted at high altitudes for the purpose of developing skill in handling the airplane and learning the results of control inputs on the action and attitude of the airplane. As soon as the pilot shows proficiency in the fundamental maneuvers, he is introduced to maneuvers requiring attention outside of the airplane while applying the maneuvers and skills that were learned at altitude.

What are Ground Reference Maneuvers?

Ground Reference Maneuvers are performed at low altitude while applying wind drift correction as needed to follow a planned track or path over the ground. The maneuvers are meant to develop the ability to control the airplane and to correct for the effects of the wind while looking for other air traffic in the area and dividing attention among other matters.

Ground Reference Maneuvers should be flown between 600-1000 ft. above the ground so that the path of the airplane over the ground can be easily noted and changes planned and effected as needed. The altitude should be low enough so any gain or loss is apparent to the student as well as any wind drift effects on the ground path. The area chosen for practice should be away from crowds or communities to prevent annoyance or hazards to others. During these maneuvers, both the instructor and student should be alert for available fields for possible forced landings.



EFFECTS OF WIND DRIFT

As soon as the airplane is airborne, it is free of ground friction. Its path will be affected by the air mass it is flying in so it's path along the ground will not always be in the exact direction in which it is headed.

WIND CORRECTION ANGLE

The preferred method of correcting for wind drift is to head the airplane into the wind enough (wind correction angle) to cause the airplane to move forward into the wind at the same rate the wind is moving the airplane sideways. When the wind drift has been neutralized, the airplane will follow the desired ground track.

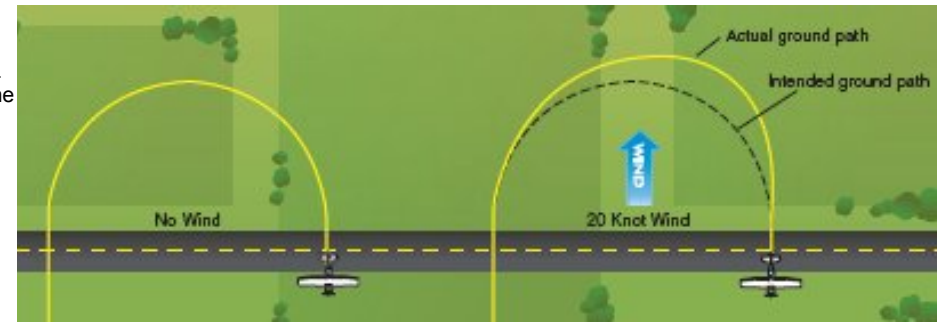
Effects of Wind on Turns

GROUNDSPEED

In a turn, the wind is acting on the airplane from constantly changing angles. The wind angle and wind speed control the time it takes to go through any part of the turn. This is due to the changing groundspeed.

When the airplane is headed into the wind its groundspeed is slower.

When the airplane is traveling with the wind, its groundspeed is faster.



Through the crosswind portion of a turn, the airplane must be turned into the wind enough to counteract the effects of wind drift on the ground track.

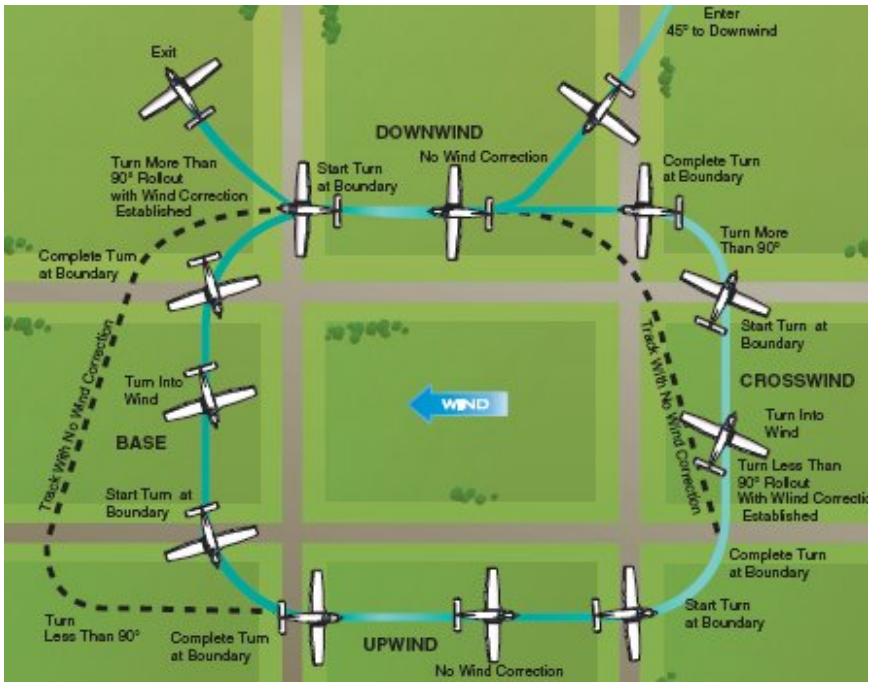
GROUND REFERENCE MANEUVERS

RECTANGULAR COURSE

The rectangular course is a training maneuver in which the ground track of the airplane is equidistant from all sides of a selected rectangular area on the ground. The maneuver simulates conditions found in an airport traffic pattern.

Objectives of the Rectangular Course

1) To develop division of attention skills between the flight path and ground references while controlling the airplane and watching for other air traffic in the area.
2) To develop the recognition of drift toward or away from a line parallel to the intended ground track which will be helpful in recognizing drift toward or from an airport runway during various legs of the traffic pattern.



Rectangular Course Set-Up

1) A square field or area with sides approx. 1 mile in length bounded on all sides by section lines or roads and away from other air traffic.
2) The airplane should be flown parallel to the field boundary at a distance half way up the wing strut. (Approx. ½ mile)
3) The closer the airplane track is to the field boundary, the steeper the bank needed at the turning points.
4) Enter the rectangular course with the wind behind the airplane so the first bank turn is the steepest. (No more than 45 degrees.)
5) All turns should be started when the airplane is abeam the corner of the field boundaries.

DOWNWIND LEG: The tailwind on this leg results in an increased groundspeed which causes the turn onto the next leg to have a steeper bank and a high rate of roll into the turn. As the turn progresses, the bank angle is gradually reduced as the tailwind decreases.

BASE LEG: On this leg the wind will tend to drift the airplane away from the course. The amount of the turn will be more than 90 degrees and, on rollout, the airplane will be turned slightly toward the field to correct for drift. As the upwind leg is approached and the turn is into the wind, the turn will be less than 90 degrees and the bank angle will shallow out as the turn into the wind reduces the groundspeed of the airplane.

UPWIND LEG: Since the wind on this leg is a headwind, it will reduce the groundspeed and will attempt to drift the airplane toward the field on the turn to the crosswind leg. For this reason, the roll-in to the turn will start slow and the bank angle will be shallow. As the turn continues to crosswind, the headwind decreases and the groundspeed increases so the bank angle and the rate of turn will gradually increase so the same distance from the edge of the field is maintained.

CROSSWIND LEG: As the turn is completed, the proper drift correction is established by turning the airplane into the wind until a uniform distance from the field boundary is maintained. With the proper wind corrections in place, the turn will be less than a 90 degree change in heading.

Instructor's Emphasis Item

It is important for the student to learn to anticipate the turns to correct for groundspeed, drift and turning radius.
When the wind is behind the airplane, the turn must be faster and steeper.
When the wind is ahead of the airplane, the turn must be slower and shallower.

GROUND REFERENCE MANEUVERS

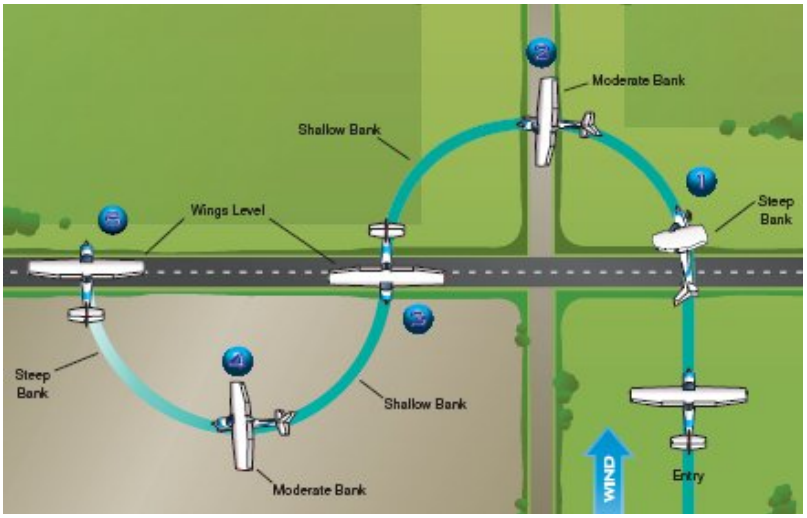
S TURNS ACROSS A ROAD

What Are S Turns Across a Road?

An S Turn Across a Road is a maneuver where the airplane's ground track describes semicircles of equal size on each side of a road or other straight line on the ground. A constant altitude is maintained throughout the maneuver.

Why Do S Turns Across a Road?

S-Turns develop the pilot's ability to adjust for wind drift during turns, follow an assigned flight path, arrive at a specified on assigned headings, and divide the pilot's attention. S turns provide a practical application of both the turn and the correction for wind drift in turns.



1) Entry

Approach the road on a downwind heading at the selected altitude. The turn should be started immediately over the road. With the wind behind the airplane, the groundspeed is the greatest and the roll into the turn will be the steepest to gain the proper wind correction angle and keep the airplane from getting too far from the road.

2) Mid Turn 1

Now the airplane's heading is changing from downwind to crosswind. The groundspeed is lessening and the angle of bank is decreasing. The wind correction angle is the greatest when the airplane is crosswind. As the turn continues, and the headwind component grows, the groundspeed keeps decreasing and the bank angle shallows until the wind correction angle is gone and the wings level as the road is crossed.

3) Start Turn 2

As the road is crossed, a turn in the opposite direction is immediately started again. With the airplane heading into the wind, the groundspeed will be slow and the bank angle will start shallow and gradually steepen. The airplane's bank starts increasing as the airplane turns to the crosswind part of the turn and the wind correction angle increases, the bank angle will steepen and the groundspeed will speed up until an arc the same size as the one in turn1 is started.

4) Mid turn 2

Now the airplane will start turning more downwind and the groundspeed will increase and so will the rate of turn and angle of bank. The turn will be completed at the same time the airplane crosses the road and the airplane is in straight and level flight.

5) Turn 3

A turn in the opposite direction is started as soon as the airplane crosses the road.

Throughout the maneuver, a constant altitude must be maintained and the bank should be constantly changing to achieve a semicircular ground track.

Instructor's Emphasis Items

CRABS AND SLIPS:

STUDENTS SHOULD BE ABLE TO GLIDE ALONG A ROAD OR RAILROAD TRACK IN FINAL APPROACH CONFIGURATION, MAINTAINING THE CENTERLINE POSITION, AT FIRST WITH A CRAB AND THEN, AFTER THE CRAB IS MASTERED, WITH A SIDESLIP.

RECTANGULAR COURSE:

- **THE PATTERN SHOULD BE A RECTANGULAR PATH OVER THE GROUND.**
- **STUDENTS MUST CRAB AS REQUIRED ON EVERY LEG THAT HAS A CROSSWIND.**
- **THEY MUST BE ABLE TO RECOGNIZE DRIFT ON ALL PORTIONS OF THE COURSE.**

THE RECTANGULAR COURSE LEGS SHOULD BE SPACED SO THAT THE ROAD IS HALF WAY UP THE WING STRUT. THE STUDENT WILL BE ABLE TO TRANSFER THIS SIGHT PICTURE TO THE TRAFFIC PATTERN IN LATER LESSONS.

ONLY WHEN THE STUDENTS HAVE MASTERED THE SLIP AND CAN FLY A SIMULATED PATTERN AT ALTITUDE, USING A ROAD AS A REFERENCE, ARE THEY READY FOR SERIOUS PATTERN WORK AT AN AIRPORT.

TURNS AROUND A POINT

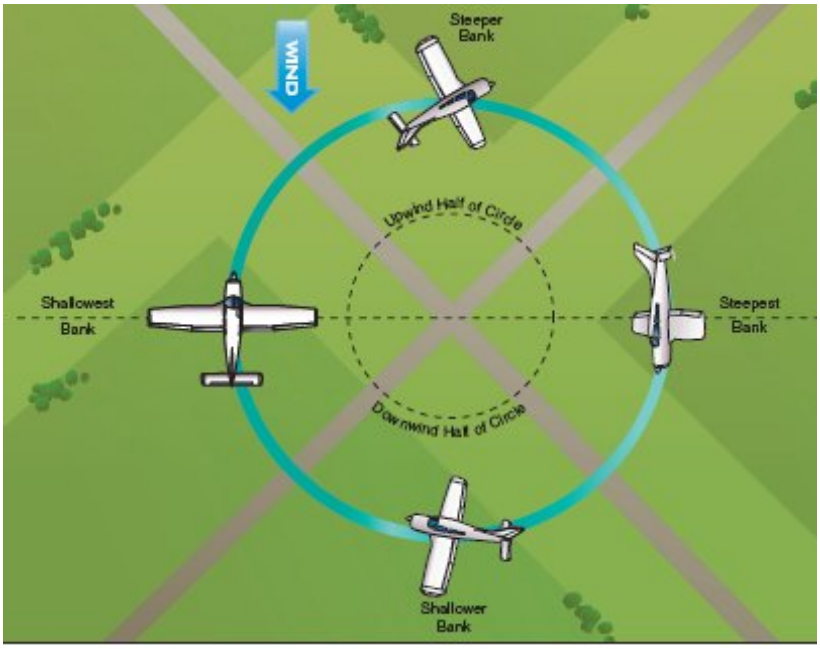
Turns Around a Point should not be confused with the steep turns you have previously done at altitude. Steep turns are done with a constant angle of bank while Turns Around a Point have constantly changing bank angles around a pre-selected point on the ground.

Why Do Turns Around a Point?

The purpose of Turns Around a Point is to help the student perfect the turning technique and improve the ability to correct for wind drift while in turns. The student also develops the ability to subconsciously control the airplane while dividing attention between the flight path and the ground references and will develop a good perception of altitude.

What Are Turns Around a Point?

In turns around a point, the airplane is flown in two or more complete circles of uniform distance from a prominent ground reference point using a bank angle of approximately 45 degrees while maintaining a constant altitude. The point selected should be prominent enough to be easily distinguished by the pilot, such as a tree or small building, yet small enough to present precise reference. As with other ground reference maneuvers, a constant radius around a point will, if any wind exists, require a constantly changing angles of bank and wind correction.



Wind Correction Angles

During the downwind half of the circle the airplane's nose is pointed more and more to the inside of the circle.

During the upwind half of the circle the airplane's nose is turned more and more to the outside of the circle.

Groundspeed Corrections

1) Entry

The airplane will enter the maneuver downwind to one side of the point at a distance equal to the radius of the turn. When any significant wind exists, it will be necessary to roll into the initial bank rapidly so that the steepest bank is abeam the reference point when the airplane is headed directly downwind and the groundspeed is the fastest.

The distance from the point must permit the pilot to see the point throughout the maneuver even with the wing lowered. If the turn radius is too large, the lowered wing will block the pilot's view of the point.

2) Downwind Abeam

After the steepest bank abeam the point, the bank will be gradually lessened until the bank is shallowest as the airplane is abeam the point and headed into the upwind. This is where the groundspeed is the slowest.

3) Upwind Abeam

At this point the bank will start increasing as the airplane starts turning downwind and the groundspeed increases. The bank will continue to steepen until the airplane is headed downwind at the entry point where the maneuver was started.

WHEN ARE WE READY FOR THE TRAFFIC PATTERN?

- **WHEN THE STUDENT HAS MASTERED THE SLIP AND CAN FLY A SIMULATED PATTERN AT ALTITUDE, USING A ROAD AS A REFERENCE, THEN THEY ARE READY FOR SERIOUS PATTERN WORK AT AN AIRPORT**
- **THE STUDENT MUST BE ABLE TO VARY AIRSPEED WHILE MAINTAINING DIRECTIONAL & ALTITUDE CONTROL**
- **GLIDES AND GLIDING TURNS SHOULD BE UNDER GOOD AIRSPEED CONTROL**
- **GROUND REFERENCE MANEUVERS NEED TO HAVE GOOD ALTITUDE AND ATTITUDE CONTROL WHILE KEEPING THE DIVISION OF ATTENTION GOING**

BOTTOM LINE: NO PATTERNS UNTIL THE AIRWORK IS SOLID.

THIS DOES NOT MEAN PVT PILOT PTS STANDARDS BUT WITHIN IN THE TOLERANCES OF SYLLABUS COMPLETION STANDARDS.

WE HAVE FOUND IT IS MUCH BETTER TO DELAY CONCENTRATED PATTERN WORK UNTIL THE AIRWORK AND GROUND REFERENCE WORK ARE ACCEPTABLE RATHER THAN RUSH OUR STUDENTS INTO TAKEOFFS AND LANDINGS HOPING THAT THINGS WILL SMOOTH OUT IN THE PATTERN. THEY RARELY DO!!!

GENERAL OBSERVATIONS WHILE TEACHING THE TRAFFIC PATTERN.

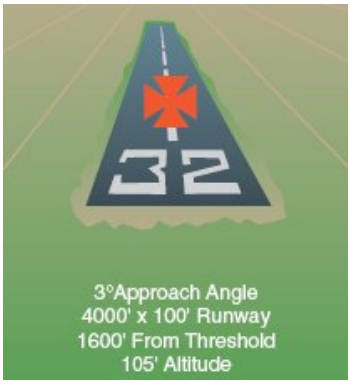
PATTERNS SHOULD BE A RECTANGULAR PATH OVER THE GROUND. STUDENTS MUST CRAB AS REQUIRED ON EVERY LEG THAT HAS A CROSSWIND. STUDENTS MUST BE ABLE TO RECOGNIZE DRIFT PARTICULARLY ON DOWNWIND AND FINAL.

STUDENTS FATIGUE EASILY WITH CONCENTRATED T. O. & LANDING PRACTICE. GRINDING AROUND THE PATTERN HOUR AFTER HOUR IS AN INDICATION THAT THE BASICS OF FLYING THE AIRPLANE HAVE NOT BEEN MASTERED.

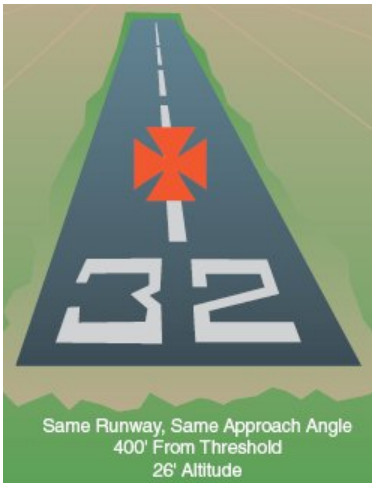
WIDE PATTERNS ARE USUALLY COUNTERPRODUCTIVE AND EXTEND THE LEARNING PROCESS.

THE MOVING SPOT TECHNIQUE

THE MOVING SPOT TECHNIQUE SHOULD BE TAUGHT. IT CAN BE DEMONSTRATED ON THE GROUND BY WALKING TOWARD A SMALL OBJECT ON THE GROUND AND NOTING THAT IT MOVES TOWARDS US AS WE ADVANCE. BY BENDING OUR KNEES WHILE ADVANCING WE CAN SEE THAT THE SPOT STANDS STILL IF WE GLIDE AT THE CORRECT ANGLE.







Aiming points are the point on the ground where an airplane on a constant glidepath would strike the ground if it was not flared for a landing. To a pilot moving straight ahead toward an object, it will appear stationary (Not moving). Objects in front and behind the aiming point will appear to move in opposite directions as you get closer, **but the aiming point will not move.**

PROVEN TECHNIQUES WITHIN THE PATTERN:

Although it is very tempting to have the student fly the entire pattern and have them land after each pattern, we find that we can break the pattern down into three different parts. Each part must be mastered separately prior to having consistent traffic patterns and landings. To accomplish this, the following procedures are highly recommended.

1. **Ensure all air work is solid before even attempting the traffic pattern.** If the student has not mastered the ability to recognize/perform: 1) Precision Glides, 2) Flap Use with Pitch and Attitude Control, 3) Precise Airspeed Control and Airspeed changes, 4) Altitude Control, 5) ground track drift and can correct it, 6) all the above tasks in different combinations, then it would be a waste of time to attempt the traffic pattern.

2. **Break the pattern and landings into three different components:**
    a. The traffic pattern legs and the Roundout
    b. The Flare/Touch Down
    c. Communications

3. Begin with the pattern. First, Instructor flies each part of the pattern with the student following along on the controls. This will overwhelm the students at first. After all, this will be the student's first attempt at putting all their newly developed skills to work at the same time. It is recommended that you further break down the process of the pattern into two elements.
    a. Aircraft Control Surfaces
    b. Power Controls

4. After demonstrating one complete pattern, **begin by having the Student operate just the throttle and carburetor heat.** The student's job will be to tell you when to turn. They are to make all power setting changes with your coaching.

    When you can make a complete pattern without having to say anything to the student about power settings or when to turn the aircraft (with you on the controls) you should be ready to trade jobs.

    You are working on getting the student into the flow of the pattern without giving him all the tasks to perform at once. If you give them too much and they go into overload, you will be driving around the pattern getting frustrated.

    Proceed through each pattern without landing the aircraft. You should simply get down to the level off point and then have the student add enough power to hold the aircraft in ground effect. This is an excellent way for the student to begin to develop some feel for his height above the ground as well as viewing the level off point. The amount of power needed to keep the aircraft from landing is learned in this exercise as well.

    Another good thing that will come from all these patterns is the development of the ability to go around. Fundamentally, each pattern will result in a go around and as long as you use "go around" terminology when you are done flying the runway then your student will quickly get comfortable doing them.

5. When you switch to managing the power, the Student should continue to need a little coaching while getting used to what skills are needed to control the pitch and trim changes as you manage the power. After one or two patterns, it is very important that you only do what the student tells you with the power. This will have the effect of flying it without really having to move the hands.

Be very precise in your flying. This is not the time to be testing them to pick up on your errors. Save that for when they no longer need your help.

6. **When your student becomes very comfortable with flying the pattern (you will know this because you are not saying anything to them other than "go around"), you are ready to work on communications**. This skill can be added at anytime you feel they are ready, even if they do not have the entire pattern figured out yet. However, often you find that the radio becomes a focus of the student's attention and the rest of the pattern skills may vanish because of a missed radio call. If you let the student have a good foundation and comfort level with the other two tasks prior to adding in the radio, you will find less of a set back when you finally do add the communications task to the mix.

   If you wait too long, your student may tend not to talk on the radio. Try adding the task in when you think they can handle it. If the task messes things up too badly, then delay it and get the flying finished first.

7. When all three tasks are in sync and the patterns require minimal coaching on your part, then it is time to have the student pull the throttle to idle and hold the nose up to land rather than add the power and do a go around. Have the student follow along with you on the first one or two attempts. Once the student gets a sight picture as the ground rises and he feels the slight g-forces associated with the flare, he usually will only take a few more patterns before they are consistently flaring and landing the aircraft without your help.

8. When the student starts to develop solid, consistent patterns and landings with minimal coaching, it is then time to make sure you get the recoveries from bounced landings and some of the other pattern emergencies out of the way so your student is comfortable knowing what can be done if something goes wrong.

9. Pattern emergencies should include:
   a. No Power from the downwind to touchdown
   b. Loss of engine on take off
   c. Engine loss on the climb out
   d. Engine fire
   e. Electrical fire
   f. Loss of communications
   g. No Flap landings
   h. Others as you think of them

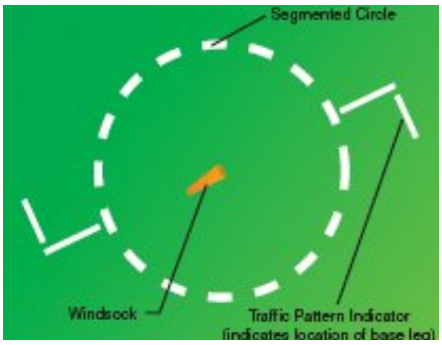
10. **If you cannot get your student past flying the traffic pattern unassisted, then it is not worthwhile starting on the landings.** Go back to the air-work and fix whatever is skill is lacking before starting the attempts to flare and to land. You will only frustrate yourself and your student and lengthen the time it takes to solo your student.

Using the above technique, you should find that, after the student is able to fly an unassisted pattern, you will have them landing on their own (comfortably) within 10 to 12 patterns. Many students seem to come together sooner.

AIRPORT TRAFFIC PATTERNS

Traffic patterns provide specific routes for takeoffs, departures, arrivals and landings. Their objective is to keep air traffic moving with maximum safety and efficiency. The exact make-up of each pattern depends on the runway in use, wind direction, obstructions, and other factors appropriate to local conditions. Since airports have different levels of complexity, pilots must know and comply with the rules and general operating procedures that apply to the airport being used. The pilot is not expected to know about all traffic patterns at all airports, but if he is familiar with the basic traffic pattern, it will be easy to make proper approaches and departures from most airports.

The Segmented Circle



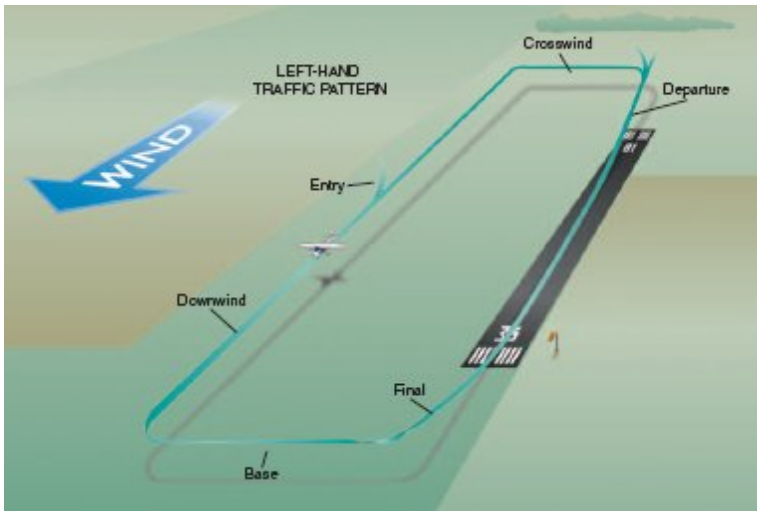
When entering the traffic pattern of an airport without an operating control tower pilots are expected to observe other aircraft already in the traffic pattern and conform to the traffic pattern in use.

If other aircraft are not in the pattern, then traffic indicators and wind indicators (the windsock) must be checked to determine which runway and which traffic pattern direction should be used.

Many airports have an L-shaped traffic pattern indicator within a segmented circle next to the runway. The short member of the L shows the direction in which traffic pattern turns should be made when using the runway parallel to the long member of the L.

These indicators should be checked from well away from any pattern that may be in use or from a height well above the generally used traffic pattern altitude. When the correct traffic pattern direction has been determined, the pilot will proceed to a point clear of the traffic pattern and then descend to pattern altitude before making an entry 45 degrees to the downwind leg.

The Standard Traffic Pattern



TRAFFIC PATTERN BASICS:

DIRECTION: All turns are to the left. ALTITUDE: Usually 1000 feet. AIRSPEED: No more than 200 knots.

PATTERN ENTRY:

The pattern should be entered in level flight at traffic pattern altitude. The entry must be at a 45 degree angle to the downwind leg with the airplane headed toward a point abeam of the midpoint of the runway to be used for landing. The entry leg should be long enough to provide a clear view of the entire pattern and to allow enough time to plan the pattern and landing approach.

DOWNWIND LEG:

This leg should flown in the opposite direction to the landing runway and approx. ½ to 1 mile out. The downwind leg continues past the approach end of the runway to a point approx. 45 degrees from the approach end of the runway. A medium bank turn is made to the base leg.

BASE LEG:

The base leg is perpendicular to the landing runway. Depending on wind conditions, it is far enough from the approach end of the runway to allow a gradual descent to the touchdown point. The pilot must ensure before turning to final approach that there is no danger of colliding with another aircraft that is already on final approach.

FINAL APPROACH:

Final approach stars with the completion of the base to final turn and continues to the touchdown point. Aircraft on final approach have the right-of-way over other aircraft in flight or on the surface. The pilot workload is highest on this leg since he must accurately control both airspeed and descent angle while approaching the intended touchdown point.

UPWIND LEG:

The upwind leg is flown parallel to the runway but is flown in the same direction as the intended landing direction. The upwind leg is the transition from final approach when a go-around is started and the climb to crosswind is begun.

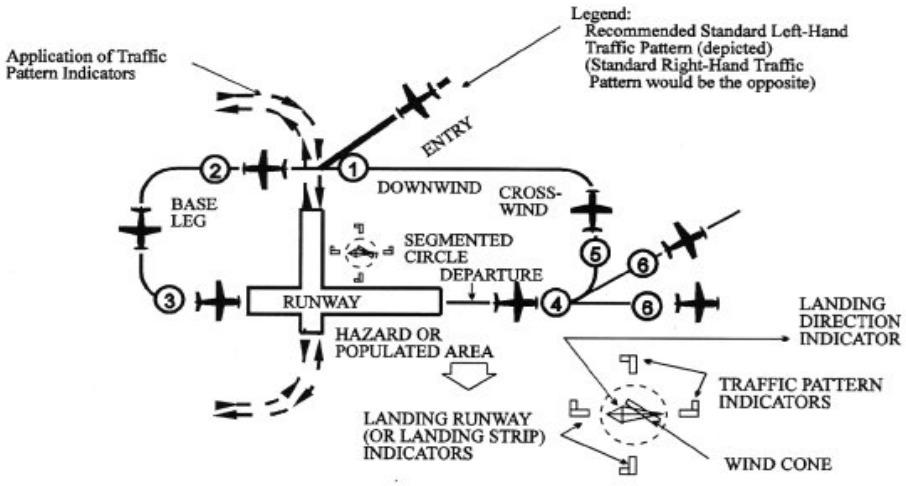
DEPARTURE LEG:

This leg starts where the airplane leaves the ground and continues until the turn onto the crosswind leg begins. If the airplane stays in the pattern, the pilot will climb to within 300 ft of the pattern altitude and turn to crosswind beyond the departure end of the runway. If the airplane departs the pattern, the airplane will continue straight out or turn 45 degrees to the left (in a left handed pattern) after passing beyond the departure end of the runway after reaching pattern altitude.

CROSSWIND LEG:

This leg of the pattern is perpendicular to the extended centerline of the runway on the departure end of the runway. It is entered with a 90 degree turn from the upwind leg of the runway. The airplane will proceed to the downwind leg of the pattern on the crosswind leg of the traffic pattern.

TRAFFIC PATTERN ENTRY PROCEDURES:



BY FAA RECOMMENDATION, ALL TRAFFIC PATTERN ENTRIES WILL BE MADE ONLY ON THE LEFT DOWNWIND LEG OF THE TRAFFIC PATTERN. UNLESS SPECIFIED IN AFD OR LOCAL POSTING TO USE RIGHT TRAFFIC.

IF APPROACHING THE AIRPORT FROM THE OPPOSITE SIDE OF THE TRAFFIC PATTERN, CROSS THE AIRPORT AT AN ALTITUDE AT LEAST 500FT ABOVE THE TRAFFIC PATTERN ALTITUDE. APPROXIMATELY TWO MILES BEYOND THE TRAFFIC PATTERN, A DESCENT TO PATTERN ALTITUDE CAN BE MADE AND THE TRAFFIC PATTERN CAN BE ENTERED ON THE LEFT DOWNWIND LEG.

THE APPROVED AIRPORTS FOR FLIGHT ACADEMY

Airport	Identifier	Pattern Altitude	CTAF

If another airport is to be used other than the airports listed here, a complete briefing identifying operational procedures both in the air and on the ground is required.

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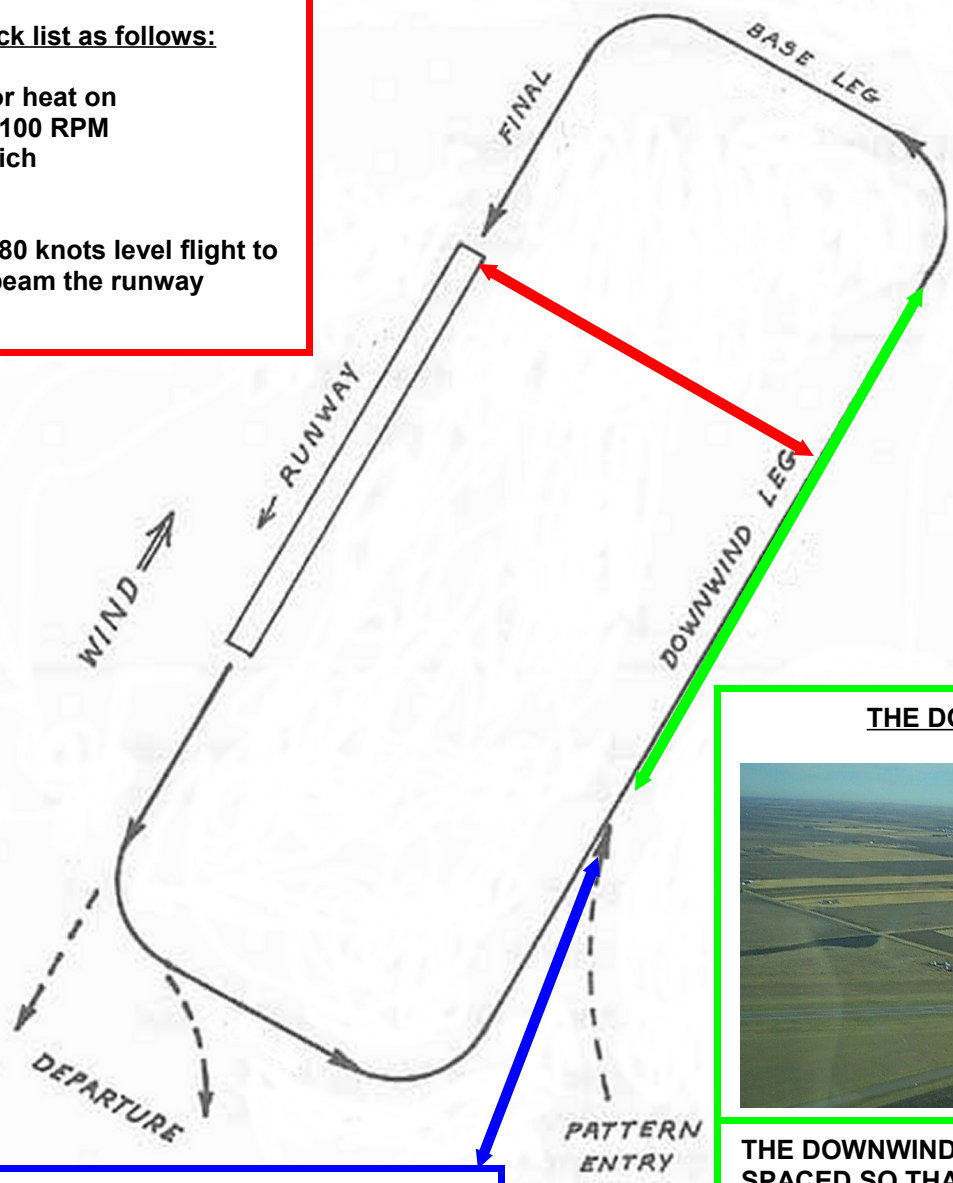
THE TRAFFIC PATTERN

PATTERN ENTRY AND DOWNWIND

Initial Aircraft Setup:

Flow Check list as follows:

Carburetor heat on
Throttle 2100 RPM
Mixture Rich
Fuel Both
Flaps 10°
Airspeed 80 knots level flight to a point abeam the runway numbers



THE PATTERN ENTRY

AS SOON AS THE PATTERN ALTITUDE IS REACHED, THE POWER SHOULD BE SET AT APPROX. 2100 RPM. THIS WILL AVOID GETTING TOO FAST, POSSIBLY ABOVE FLAP SPEED.

THE STANDARD FAA RECOMMENDED TRAFFIC PATTERN ENTRY IS 45° TO THE DOWNWIND LEG. THE STUDENT WILL AIM FOR THE POINT ON THE RUNWAY WHERE AIRCRAFT WILL TOUCH DOWN (USUALLY THE NUMBERS). THE ENTRY IS SIMILAR TO USING AN ON-RAMP TO MERGE WITH TRAFFIC ON THE FREEWAY

THE DOWNWIND LEG



THE DOWNWIND LEG SHOULD BE SPACED SO THAT THE RUNWAY IS HALF WAY UP THE WING STRUT. THE SPACING MAY BE MODIFIED FOR STRONG CROSSWINDS.

STUDENTS SHOULD HAVE ONE HAND ONLY ON THE YOKE!! THE OTHER HAND SHOULD BE ON THE THROTTLE WHEN NOT SELECTING FLAP SETTINGS OR ADJUSTING THE TRIM.

USE A LIGHT GRIP AND AVOID "CHOKING" THE YOKE.

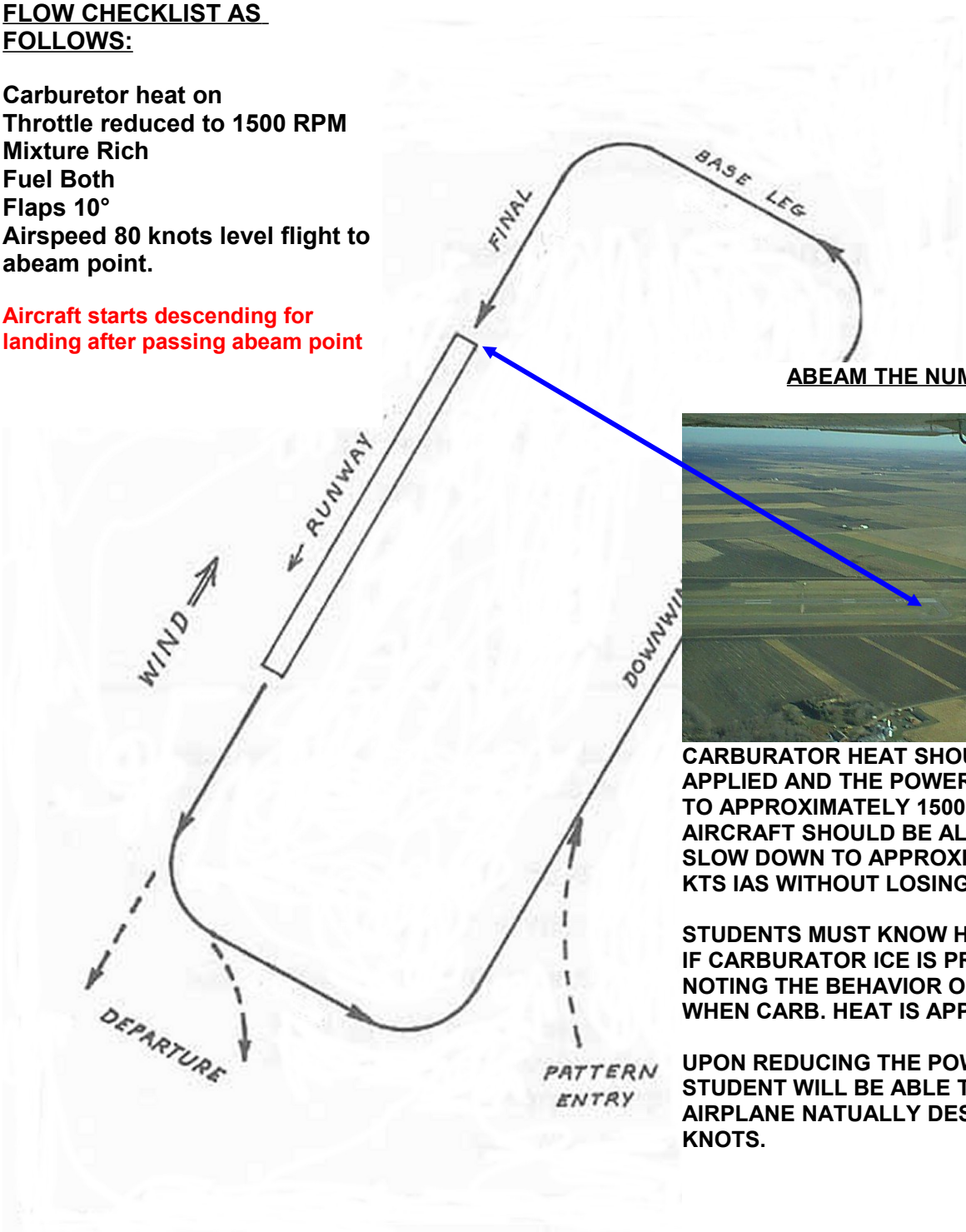
THE TRAFFIC PATTERN
ABEAM THE NUMBERS

ABEAM THE NUMBERS SETUP:

FLOW CHECKLIST AS FOLLOWS:

Carburetor heat on
Throttle reduced to 1500 RPM
Mixture Rich
Fuel Both
Flaps 10°
Airspeed 80 knots level flight to abeam point.

Aircraft starts descending for landing after passing abeam point



ABEAM THE NUMBERS

CARBURATOR HEAT SHOULD BE APPLIED AND THE POWER REDUCED TO APPROXIMATELY 1500 RPM. THE AIRCRAFT SHOULD BE ALLOWED TO SLOW DOWN TO APPROXIMATELY 80 KTS IAS WITHOUT LOSING ALTITUDE.

STUDENTS MUST KNOW HOW TO TELL IF CARBURATOR ICE IS PRESENT BY NOTING THE BEHAVIOR OF THE TACH. WHEN CARB. HEAT IS APPLIED.

UPON REDUCING THE POWER THE STUDENT WILL BE ABLE TO LET THE AIRPLANE NATUALLY DESCEND AT 80 KNOTS.

THE TRAFFIC PATTERN
TURNING TO BASE LEG

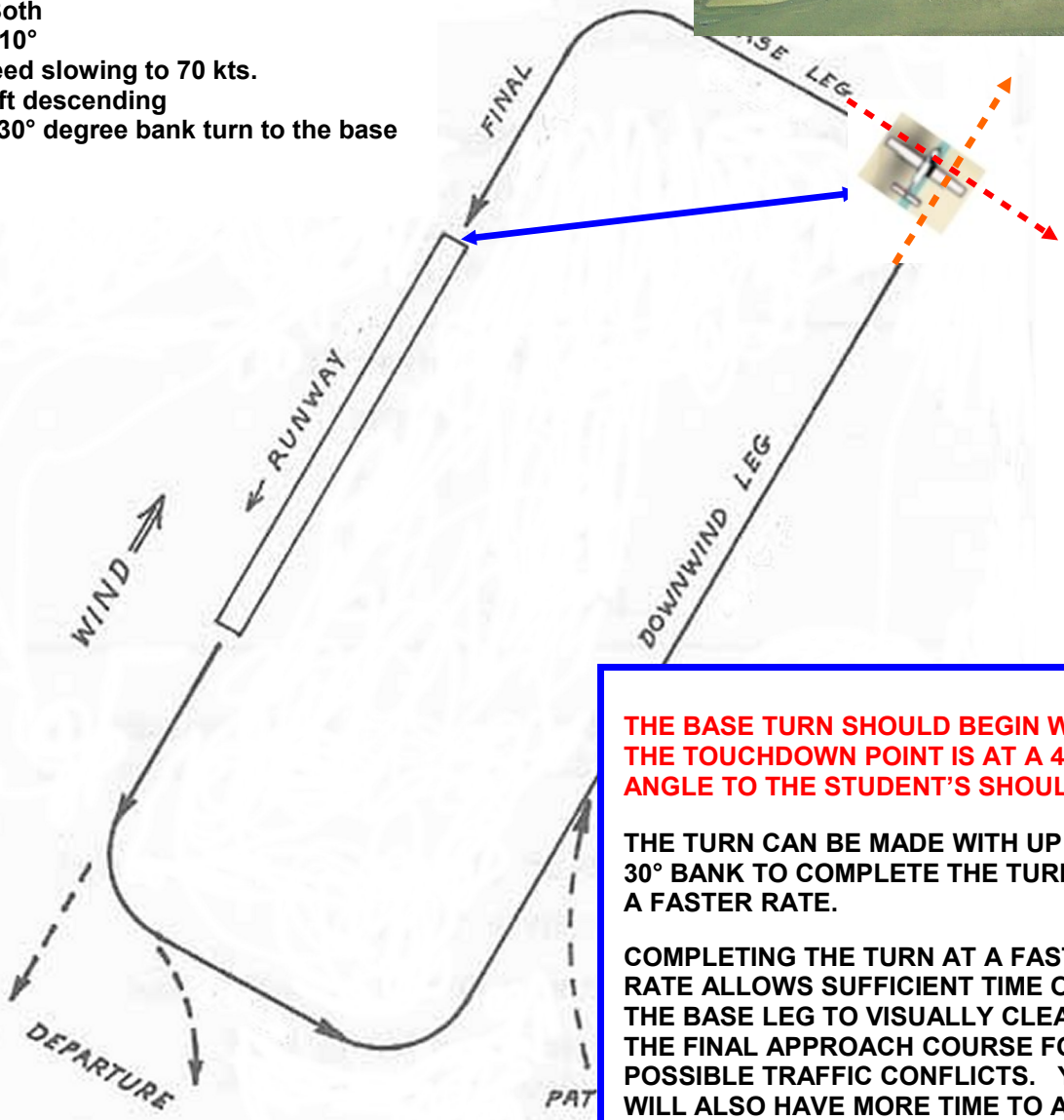


45° BASE TURN POINT

BASE TURN SETUP:

Flow Checklist as follows:

Carburetor heat on
1500 RPM
Mixture Rich
Fuel Both
Flaps 10°
Airspeed slowing to 70 kts.
Aircraft descending
Up to 30° degree bank turn to the base leg



THE BASE TURN SHOULD BEGIN WHEN THE TOUCHDOWN POINT IS AT A 45° ANGLE TO THE STUDENT'S SHOULDER.

THE TURN CAN BE MADE WITH UP TO A 30° BANK TO COMPLETE THE TURN AT A FASTER RATE.

COMPLETING THE TURN AT A FASTER RATE ALLOWS SUFFICIENT TIME ON THE BASE LEG TO VISUALLY CLEAR THE FINAL APPROACH COURSE FOR POSSIBLE TRAFFIC CONFLICTS. YOU WILL ALSO HAVE MORE TIME TO APPLY THE SECOND 10° OF FLAPS BEFORE MAKING THE TURN TO THE FINAL APPROACH LEG OF THE PATTERN.

THE TRAFFIC PATTERN
THE BASE LEG AND FINAL APPROACH

Final Approach Setup:

Flow Check list as follows:

Flaps 30° (Full Flaps)
Airspeed 60 – 65 knots on Short final
Pitch for airspeed
Power for Glide Path

Base Leg Setup:

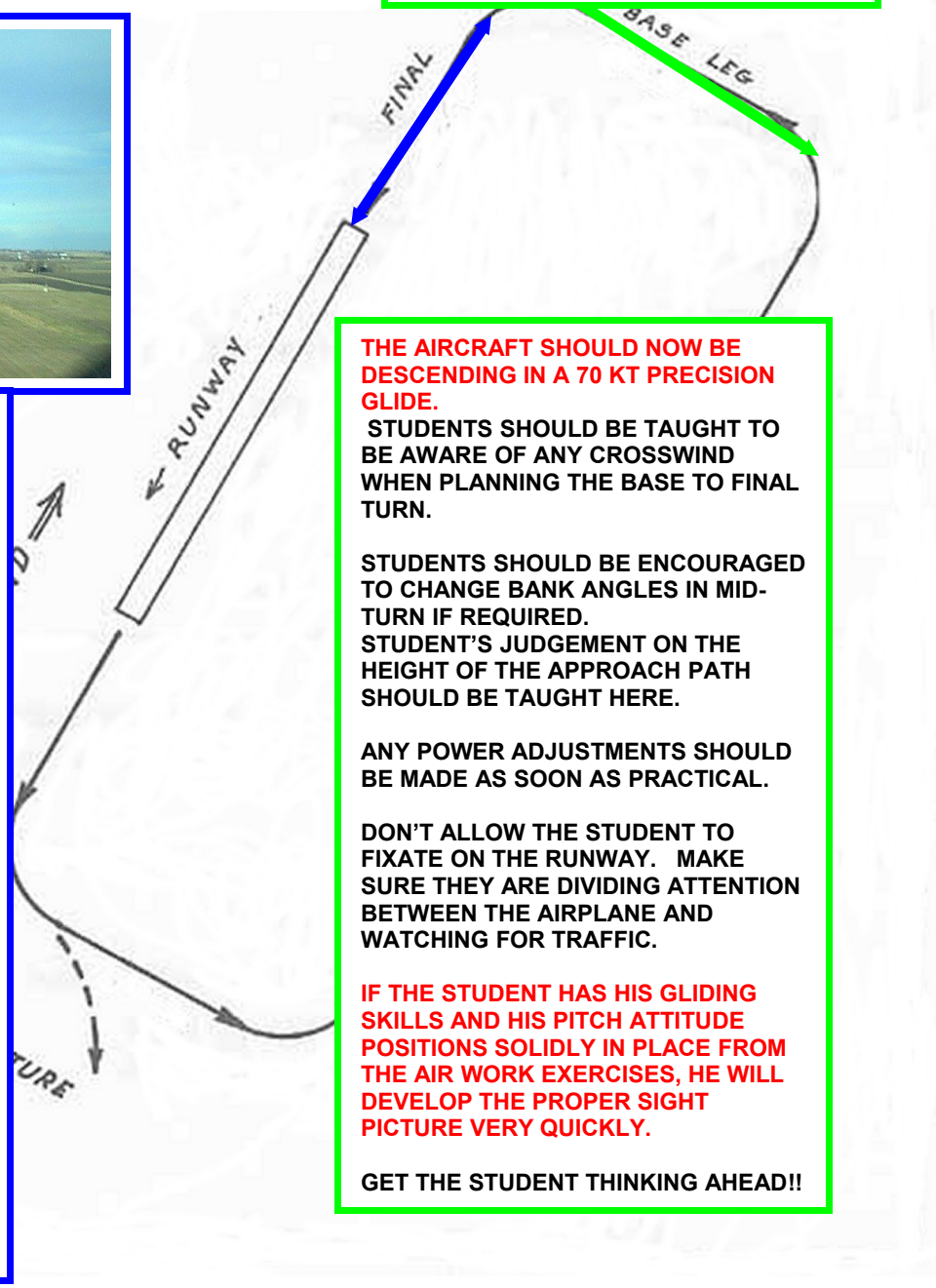
Flow Check list as follows:

Carb. heat on
Mixture Rich
Fuel Both
Flaps 20°
Airspeed 70 knots
Aircraft Descending

DO NOT EXCEED 30° OF BANK IN THE BASE TO FINAL TURN







STUDENTS SHOULD USE THE ALTIMETER ON ALL LEGS OF THE PATTERN. **IN A NORMAL SIZE PATTERN, FINAL SHOULD BE TURNED AT ABOUT 400 - 500 FT. AGL.** IF THIS IS UNLIKELY, POWER SHOULD BE ADDED AS SOON AS THE PROBLEM IS RECOGNIZED RATHER THAN WAITING TO BE TOO LOW ON FINAL.

A CRAB SHOULD NOT BE USED ON FINAL APPROACH BECAUSE STUDENTS NEED ALL THE SLIP PRACTICE THEY CAN GET.

STUDENTS SHOULD UNDERSTAND THAT THE GLIDE ANGLE WILL BE STEEPER WITH MORE HEADWIND ON FINAL.

USE THE RUNWAY MARKERS OR THE NUMBERS AS A REFERENCE ON FINAL. AT FIRST THE STUDENT WILL HAVE TO BE VERY CLOSE TO SEE ANY SPOT MOTION. WITH PRACTICE, THEY WILL PICK UP THE SPOT MOTION FURTHER OUT ON FINAL. ON FINAL, IF IN DOUBT, ADD POWER.

GOOD TRIM HABITS ARE ESSENTIAL TO ALLOW THE STUDENT TO PROGRESS QUICKLY IN THIS PHASE OF TRAINING.

THE AIRCRAFT SHOULD NOW BE DESCENDING IN A 70 KT PRECISION GLIDE.

STUDENTS SHOULD BE TAUGHT TO BE AWARE OF ANY CROSSWIND WHEN PLANNING THE BASE TO FINAL TURN.

STUDENTS SHOULD BE ENCOURAGED TO CHANGE BANK ANGLES IN MID-TURN IF REQUIRED.
STUDENT'S JUDGEMENT ON THE HEIGHT OF THE APPROACH PATH SHOULD BE TAUGHT HERE.

ANY POWER ADJUSTMENTS SHOULD BE MADE AS SOON AS PRACTICAL.

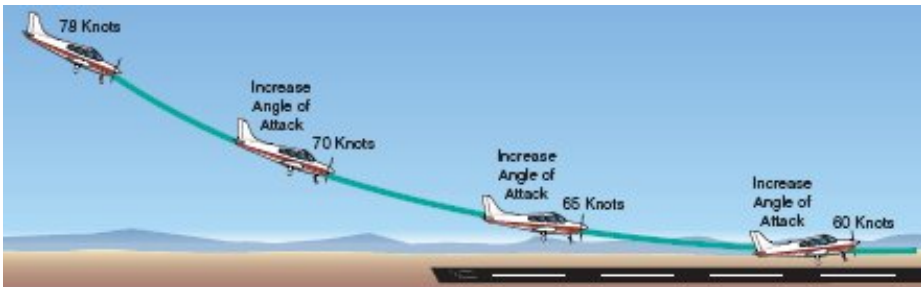
DON'T ALLOW THE STUDENT TO FIXATE ON THE RUNWAY. MAKE SURE THEY ARE DIVIDING ATTENTION BETWEEN THE AIRPLANE AND WATCHING FOR TRAFFIC.

IF THE STUDENT HAS HIS GLIDING SKILLS AND HIS PITCH ATTITUDE POSITIONS SOLIDLY IN PLACE FROM THE AIR WORK EXERCISES, HE WILL DEVELOP THE PROPER SIGHT PICTURE VERY QUICKLY.

GET THE STUDENT THINKING AHEAD!!

THE LANDING PROCESS

The RoundOut (Flare)



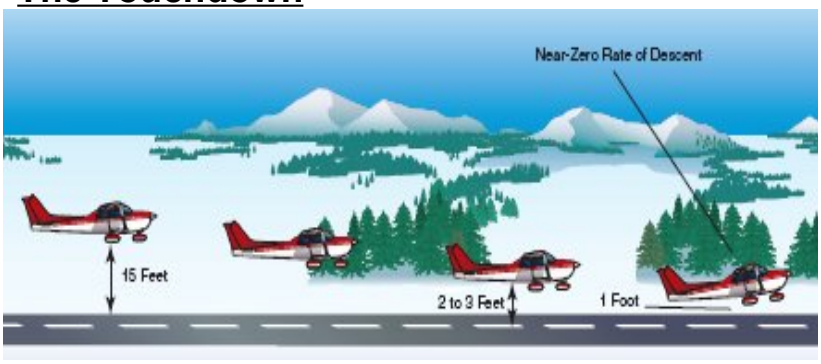




The roundout starts when the airplane approaches to within 10-20 feet of the ground. Back pressure is applied on the elevator to slowly increase the pitch attitude and the angle of attack at a rate that will allow the airplane to continually settle slowly as the forward speed decreases. Power is normally reduced to idle during the roundout causing the airspeed to gradually slow to touchdown speed.

Once the process of rounding out has started it should be a continuous back pressure until the airplane touches down. If too much back pressure has been used, the elevator should not be pushed forward. The pressure should be held constant and it may be necessary to add power slightly to prevent an excessive rate of sink or a hard touchdown.

The Touchdown





LOOK DOWN THE RUNWAY ABOUT A FOOTBALL FIELD IN LENGTH. WHEN THE RUNWAY APPEARS TO RISE, LEVEL OFF ABOVE THE RUNWAY HOLDING THAT LEVEL FLIGHT ATTITUDE FOR A COUPLE SECONDS. THE RUNWAY RISING PICTURE CAN BE TAUGHT ON THE GROUND. BEND AT THE WAIST WHILE LOOKING AHEAD AND NOTE THAT THE GROUND APPEARS TO RISE.

AFTER THE LEVEL OFF, SLOWLY RAISE THE NOSE TO A SLIGHTLY NOSE HIGH POSITION AND HOLD IT THERE WITH INCREASING BACK PRESSURE UNTIL TOUCHDOWN. IT IS BETTER TO BE TOO SLOW WITH RAISING THE NOSE THAN TOO FAST. LANDING IN A LEVEL ATTITUDE IS NOT UNSAFE EVEN THOUGH IT IS UNDESIRABLE.

NO “FEELING” FOR THE RUNWAY BY ALTERNATELY RAISING AND LOWERING THE NOSE SHOULD BE ALLOWED!!

ONCE THE NOSE STARTS UP IT SHOULD NOT BE LOWERED EXCEPT IN A HIGH LEVEL OFF WHICH USUALLY RESULTS IN A GO AROUND ANYWAY. NO ATTEMPT SHOULD BE MADE TO SALVAGE A BAD LANDING WITH POWER. THIS IS A GOOD TIME TO PRACTICE ONE OF THE THREE REQUIRED GO AROUNDS.
STUDENTS WILL FEEL A LITTLE G LOAD PUSHING THEM DOWN IN THE SEAT WHEN THEY RAISE THE NOSE AFTER LEVEL OFF. IT FEELS AS THOUGH THEY ARE BALLOONING AND, AT FIRST, MAKES THEM WANT TO DROP THE NOSE. THIS NATURAL FEELING SHOULD BE EXPLAINED.

STUDENTS MUST RECOGNIZE WHEN THEY ARE UNLIKELY TO LAND ON THE FIRST THIRD OF THE RUNWAY, OR IN THE MIDDLE THIRD LATERALLY, AND SHOULD INITIATE A GO-AROUND AS SOON AS THE PROBLEM IS RECOGNIZED

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THE LANDING PROCESS

THE LANDING ROLLOUT



Instructor Emphasis Items

STUDENTS MUST BE TAUGHT TO BE SENSITIVE TO DIRECTIONAL CONTROL DURING LANDING ROLLOUT AND ANY SUBSEQUENT TAKEOFF. PARTICULAR ATTENTION MUST BE PAID TO THE RUDDER AND ITS IMPORTANCE IN ASSISTING WITH DIRECTIONAL CONTROL.

THE YOKE SHOULD BE GRADUALLY TURNED INTO THE WIND AS THE AIRPLANE SLOWS (UNTIL THE YOKE IS AGAINST THE STOP FOR A FULL STOP LANDING). ON A TOUCH AND GO THE RIGHT RUDDER MUST BE ADDED AS THE THROTTLE IS ADVANCED.


CAP
N229NY