PREPARATION FOR FLIGHT TEST – Ground Work

You should all have a copy of the **Flight Test Guide Private Pilot Licence TP13723E** – you should thoroughly review this document to ensure you know what the expectations are for your flight test.

As part of the flight test, you will do a preflight briefing and assessment with the Designated Flight Test Examiner. The required knowledge level that must be demonstrated is in Exercise 2 of the Flight Test Guide, pp. 7 – 10 and Exercise 23A (Preflight Planning), p. 22, as well as Exercise 29 (Emergency Procedures Malfunctions), p. 26. This information will be reviewed with you today. You will not be spoonfed the information – your success on the flight test groundwork is dependent on your own preparation and knowledge – we can tell you the required knowledge level and where the information is. If you have any further questions on these areas, you should ask your instructor as well prior to doing the preflight test.

At the preflight and actual flight test, you must be able to demonstrate the following:

- **Documents & Airworthiness:**
  - you must be able to list out the required documents – what are the minimum insurance requirements; when is an aircraft radio licence required on board an aircraft?
  - what keeps the C of A valid? is the plane airworthy from a maintenance standpoint? Are there any outstanding or deferred snags on the aircraft? When is its' next inspection due and how many hours are there till that next inspection? How do you deal with snags in the journey log?
  - C of R – questions on what keeps it valid? What if the aircraft is sold?
  - Weight & Balance – is the weight and balance valid? How changes affect the weight and balance document?
  - where are the intercept orders? When do we have to carry them on board?

- **Aeroplane Performance:**
  - you must know from memory the following speeds:
  - best angle of climb speed
  - best rate of climb speed
  - manoeuvering speed
  - you should also know the stall speed of the aircraft
  - you should also know operational speeds or be able to find them in the POH
  - know definitions of speeds above
  - calculate cross wind
  - know cross wind limit of the aircraft

You must come to the flight test having already calculated:
- take off and landing distance to clear a 50ft obstacle

- **Weight & Balance**
  - You must come to the flight test having already calculated a weight and balance for take off and for landing using actual numbers for the intended flight – for calculating purposes, use standard winter male from the AIP
  - Be able to plot the weight and balance into both the moment and inches aft of datum envelopes of the POH
  - Explain how to correct a situation where the weight and balance is not within the envelope and explain changes in aircraft performance

- **Preflight Planning**
  - DFTE will review their prepared navigation log which is to comprise a trip from Boundary Bay to Chilliwack, Chilliwack to Penticton by the most logical route – have winds available for review
  - You will be asked to identify several map symbols from memory
  - You will then be asked to provide the DFTE with a weather briefing for the intended flight

- **Preflight Inspection**
  - you will be asked to identify various parts of the aircraft including antennas, visual engine components and aircraft controls, pitot static system, fuel quantity and fuel grade
  - must provide a passenger briefing
  - you will be asked to give two emergency procedures from memory (see Exercise 29 – p. 26 for the list)

Again, it is important to recognize that the flight test involves not only the flying component but the ground component as well and does require a significant amount of studying to be successful. If you do not obtain high marks on the ground work, it is a result of poor preparation for the flight test on the student pilot's part. You know have all the basic information required to do the ground portion of the Private Pilot Flight Test.

The aircraft:

Legally:

It is the pilots responsibility to ensure that all documentation required be on board and valid for the flight.

Documents: (ground up pg 109)

A airworthiness, issued by, stamped and signed by transport Canada, states that the aircraft conforms to transport Canada design standards and is fit and safe for flight. Providing all other requirements are met, to keep this valid.

I inspection (maintenance 100 hr)
S snags, none in journey log
P pre flight inspection
E eligibility stamp and signature
W weight and balance (in limits)
O operated in accordance with POH

R registration, is proof of ownership and registration, no aircraft, except hang gliders, can fly in Canada, unless they are registered. registers aircraft with transport Canada, aircraft must show, nationality and registration numbers clearly. Is valid until change of ownership or aircraft is decommissioned Upon change of ownership you have seven days to send in the forms: top to regional TC office, middle stays with aircraft, is good for 3 months, bottom goes to Ottawa TC office.

R radio station license (aircraft) (or radio operators certificate??) does not need to be carried as long as the plane is operated in Canada or the US.

O POH, must be carried on board so the pilot can refer to it should an emergency arise. Pilot should know the POH inside out.

W weight and balance, must be done for every flight, to be sure the weight and c of g is in limits for the type of flight.

I intercept orders, must be carried on board at all times, explains signals and what to do in the event that you are intercepted by military aircraft.

L liability insurance, every private aircraft operated in Canada must be insured against liability and carry proof of insurance with the aircraft.

L logbook, the journey log must be carried on board for every flight that is planned to land at a destination other than that of departure, entries in the logbook, include flight time, airtime, departure and destination airports, pilot in command, weight, passengers and fuel.

L license, all pilot and crew licenses must be on board for every flight.

Physically:

Aircraft walk-around: (POH PG 4-4 to 4-6)

Take out POH turn to pg 4-4,

Aircraft Documentation

A – Certificate of Airworthiness

R – Certificate of Registration

R – Radio Operators License

O – Pilot Operating Handbook (P.O.H)

W – Weight & Balance

J – Journey Log

I – Intercept Orders

L – Licenses (Medical, One of ~ Student Pilot Permit, PPL, CPL)

L – Liability Insurance

H.A.L.T Check

H – Height (Recover by 2000' AGL)

A – Aircraft (Gauges, Switches, Fuel, Mixture, Carb Heat, Doors, Bags, Belts

L – Location (Practice Area – Glen Valley, Pitt)

T – Traffic (Lookout for other aircraft - 180° Turn [redacted] OR 2x 90°

Radio Frequencies

Boundary Bay Airport – **CZBB**

FUEL	**122.95**
ATIS	**125.5**
GROUND	**124.3**
INNER TOWER	**118.1**
OUTER TOWER	**127.6**

Langley Airport – **CYNJ**

ATIS	124.5
GROUND	121.9
TOWER	**119.0**

Glenn Valley - **Practice Area**

Traffic	**122.75**

Pitt Meadows Airport – **CYPK**

ATIS	125.0
GROUND	123.3
TOWER	**126.3**

Pitt - **Practice Area**

Traffic	**122.75**

ATIS Phone: AUTOMATED

* Store following in phone

CZBB – [redacted] → 604 591-9674

CYNJ – [redacted]

CYPK – [redacted]

, CYVR, CYXX

CYYJ

[redacted]

[redacted]

[redacted]

Bellingham customs	1 360 734 3520	Fax 1 360 734 7678
Seattle center op/cl flight plans	1 800 992 7433	
US flight services	1 206 767 2726	
Boundary bay customs	1 888 226 7277	
EMERGNCY ONLY NUMBERS		
Boundary bay tower	1 604 946 0911	
Langley tower	1 604 534 9443	
Pitt Meadows tower	1 604 465 9723	
Abbotsford tower	1 604 855 1199	
Victoria tower	1 250 655 2866	

Bellingham			**Seattle radio**			**Flight following**	
Ground	127.4		US Flight plans	122.15			122.1
Tower	124.9						
Atis	134.45		**Whidbey approach**				
				120.7			
Seattle center			**Seattle approach**				
	128.5		From seattle	120.4			

Boundary bay			**Abbotsford**			**Victoria**	
Ground	124.3		Ground	121.8		Ground	121.9
Inner tower	118.1		Inner tower	119.4		Inner tower	119.7
Outer tower	127.6		Outer tower	121.0		Outer tower	119.1
Atis	125.5		Atis	119.8		Atis	118.8
Langley			**Pitt Meadows**			**Naniamo**	
Ground	121.9		Ground	123.8		Radio	122.1
Tower	119.0		Tower	126.3			
Atis	124.5		Atis	125.0			
Glen Valley			**King George**			**Powell river**	
Traffic	122.75		Traffic	123.5		Traffic	123.0
Fort Langley			**Kamloops**			**Sechelt**	
Traffic	132.2		Fic	122.37		Traffic	123.5
VANCOUVER AREA ATIS			604 591 9674				

ALL #S MUST BE VERIFIED BY PILOT

ON Regular Basis (ie every time [illegible])

Radio Operations

Out Bound:

1.) Ground

"Bay Ground, Cessna 152 Golf Uniform Uniform Yankee at PFC, request taxi – local east, one thousand four hundred with information Delta"

2.) Inner Tower

"Bay Tower, Uniform Uniform Yankee is ready on Alpha"

3.) Outer Tower

"Bay Tower, Uniform Uniform Yankee is with you through 800"

In Bound:

4.) Outer Tower

"Bay Tower, Cessna 152 Golf Uniform Uniform Yankee approaching (King George / Nikel) one thousand five hundred – inbound for landing with information Delta"

5.) Inner Tower

"Bay Tower, Uniform Uniform Yankee with you (over/north) the gas station"

5.) Ground

"Bay Ground, Uniform Uniform Yankee on Delta for the Apron"



Takeoff / Landing / Crew Briefings

Note: These are general briefings and may be altered within reason

Passenger:

"All passengers, we are preparing for (Takeoff / Landing) please ensure your seatbelts are fastened, doors are locked, seats in there upright and locked position, and any personal belongings stowed safely below your seat."

Crew:

"This will be a Normal Takeoff, once cleared for takeoff we'll center the runway and apply full power, call gauges green, airspeed alive, rotate at 55 kts and climb for 67"

Crew Emergency:

"Our Go / No Go point will be
("Abeam Tower" for RWY 12 / "Taxiway Bravo" for 25)
Should we not be air born by this point, we will reject the takeoff by calling reject takeoff. We'll go throttle to Idle, Apply brakes, and call tower with our intensions"

In the event of an engine fire or failure below 500', we will lower the nose for (152 = 60 kts) (172 = 65 kts) and attempt to land on any available surface ahead and declare an emergency"

In the event of an engine fire or failure above 500', we will lower the nose for (152 = 60 kts) (172 = 65 kts) and attempt to land on any available surface ensuring no turns greater than 30° and declare an emergency"

Any Questions?

Rolling Instrument Check

While Taxiing

Turn to the **Left** – Look Left

Instrument Referring	Announce Verbally
Turn Coordinator – A/C	"Needle Left"
Turn Coordinator – Ball	"Ball Right"
Heading Indicator	"Decreasing"
Altimeter	"Steady"
Vertical Speed Indicator	"Steady"
Compass	"Compass Free and Swinging"

Turn to the **Right** – Look Right

Instrument Referring	Announce Verbally
Turn Coordinator – A/C	"Needle Right"
Turn Coordinator – Ball	"Ball Left"
Heading Indicator	"Increasing"
Altimeter	"Steady"
Vertical Speed Indicator	"Steady"
Compass	"Compass Free and Swinging"

FLIGHT TEST QUESTION

Crew Licenses (required on board)

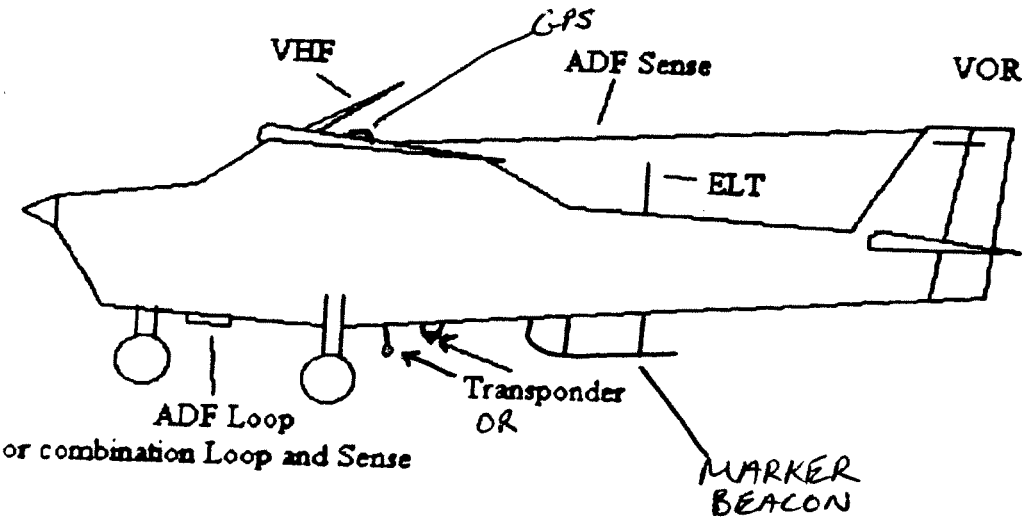
- PPL endorses all single engine, single pilot, non-high performance land aircrafts.
  - o High performance = Vne greater than 250 kts and or Vso greater than 80 knots.
- Issued for life (must be kept current as per CAR's and must be validated with current medical certificate.
- Medical PPL - Cat 3 valid for - 5 years if under 40
  - 2 years if over 40

  CPL - Cat 1 valid for - 1 year if under 40
  - 6 months if over 40

Pitot Tube and Static Port

1. Effects of complete pitot blockage
   - ASI - Over read in climb
     - under read in descent
   - ALT - Unaffected
   - VSI - Unaffected
2. Effects of complete static blockage
   - ASI - Under read in climb
     - Over read in descent
   - ALT - Freeze
   - VSI - Freeze

Antenna



FLIGHT TEST QUESTION

IN AIRCRAFT PART OF THE TEST

Passenger Briefing
- Exits / Door operation.
- Use of seat belts.
- Location of fire extinguisher and how to use it.
- Hands & feet away from controls.
- Location of the First aid kit.
- Location of ELT and how to switch it on.
- Air sick bags.

Engine Start
- Must use the CHECK LIST.

Ancillary Controls
- How and when to use them:
  - Mixture
  - Carb heat
  - Air vents / heater

Taxiing
- Power / Speed
- Brakes - Do not ride (pull control column back when using brakes)
- Cross wind inputs (Turn into / Dive Away)

Climbs
- Best angle
- Best rate
- Normal
- Enroute

Descents
- Best Glide
- Approach
- Enroute

Turns
- Angle of Bank
  - Gentle
  - Medium
  - Steep
- Climbing Turn
  - Gentle turns only

Slow flight
- HALT Check
- Entry (As power is added to maintain altitude MUST say "we are now in slow flight)
- Maintain / Turns / Flaps
- Recovery

Stall
- HALT Check
- Entry
  - Power OFF
  - Power ON
  - Climbing
  - Descending
  - Turing
  - Climbing turn
- Recognition
- Recovery
  - Power OFF and Power ON

FLIGHT TEST QUESTION

Spins
- HALT Check
- Entry
- Recovery
- Incipient Spin

Spiral Dive
- Recognition
- Recovery

Slipping
- Sideslip
- Slipping Turn
- Forward Slip
- Instrument Error

Take-off / Approach & Landing
- Normal
- Crosswind / Max demonstrate Crosswind component
- Short field
- Soft field
- Obstacle
- Overshoot

Circuit
- Controlled
- Uncontrolled
- Altitudes
- Pattern

Precautionary
- OWLS Check
- High level inspection 1000' AGL
- Low level inspection 500' AGL 70 Kt and 10 degress flaps
- Count the field, one second = 100 feet

Forced Approach
- Carb Heat ON
- Glide speed (best glide)
- Field (OWLS)
- Approach
- Cause Check
- NO starts - Communication
  - 121.5 Mayday X 3
- Transponder
  - 7700
- Passenger Briefing
- On final
  - Shut down (2 fuel, 2 electric)

Diversions
- Pick landmark (where you are).
- Draw free hand line on map from landmark to destination.
- Measure distance.
- Determine Heading.
- Determine time required.
- Determine fuel required.
- Reset heading indicator.
- Determine point for revise ETA

FLIGHT TEST QUESTION

Navigation

Planning the cross-country - Flight log preparation

1. Weather (time of issue, validity)
   - FA
   - METAR
   - TAF
   - FD
   - NOTAMS
2. Refer to the Canada Flight Supplement (CFS) for appropriate airport information and frequencies.
3. Draw a track line on the chart from the departure point to the set heading point (SHP) to the intended destination.
4. Record true track (T.T.) between points.
5. Mark every 10 nm along the track line.
6. Mark 10 degree drift lines.
7. Record distances:
   a. departure point > set heading point
   b. set heading point > destination point
   c. between checkpoints
8. Record magnetic variation.
9. Record magnetic track (MT).
   MT = TT +/- Magnetic variation
   (East > subtract / West > add)
10. Calculate the magnetic heading (MH) (wind correction - WCA).
    MH = MT +/- WCA
    or MH = TH +/- magnetic variation
11. Select cruising altitude
    - consider the highest elevation along track, airspace restrictions.
    - consider VFR Cruising Order
      - Based on magnetic track
      - 0 M to 179 M is odd thousand + 500 feet
      - 180 M to 359 M is even thousand + 500 feet
      - takes effect at 3000' AGL and above.
12. Select power setting and determine corresponding BHP, KTAS and GPH.
13. Calculate for calibrated airspeed (KCAS) and indicated airspeed (KIAS).
14. Calculate ground speed.
15. Calculate time required
    - en-route
    - Climb
    - consider time for start, run-up, taxi and circuits.
16. Calculate fuel consumption
    - start, run-up and taxi
    - climb
    - cruise
    - circuits
    - reserve requirements (day VFR = 30 min. / night VFR = 45 min.

FLIGHT TEST QUESTION

17. Calculate and record totals
    - Distance
    - Time
    - fuel

18. Record compass heading, distances, en-route times in the en-route section of the Nav log.

Instruments

- Pitot-Static system
    - ASI, ALT, and VSI
- Suction
    - HI and AI
- Electrical
    T&B and TC

Emergencies

- Engine fire
- Electrical fire
- Wing fire
- Cabin fire
- Over or under voltage
- Communication failure
    - light signal
    - 7600 transponder code
- Emergencies
    - 7700 transponder code

ELT

- When you can test it.
    - first 5 min of each Z hour and for 5 seconds.
    - after each flight listen to 121.5 to insure ELT is not set off.
- When must it be on board
    - when flying over 25 nm away from home base

UNOFFICIAL CHECKLIST FOR FLIGHT TESTS

- ☐ Flight test location and time
- ☐ Licence, SPP, MC
- ☐ Letter of Recommendation
- ☐ Flight Test Fee
- ☐ E6B or flight computer, Pencils, pen, etc
- Weather
  - ☐ METARS: Depart, enroute, destination
  - ☐ TAF: Depart, enroute, destination
  - ☐ FA
  - ☐ SIGMET, AIRMET, UA
  - ☐ NOTAM: Depart, enroute, destination
- ☐ Current Chart Prepared
- ☐ Current Canada Flight Supplement
- ☐ Nav Log
- ☐ Flight Plan
- ☐ Weight and Balance for takeoff
- ☐ Weight and Balance for landing } plotted
- + zero fuel
- Distances
  - ☐ Takeoff
  - ☐ Landing
- ☐ Cross Wind Landing Chart
- ☐ Documents (List)
- ☐ IFR Hood
- ☐ Aircraft
  - ☐ Fuel on board (or ordered)
  - ☐ Oil
  - ☐ Windows cleaned
- ☐ Cross Country Depart _____ Stop / _____ Dest _____
  Persons on Board: Male _____ Female _____ Children _____
  Cargo _____ Lbs:
- ☐ Relax (yea right)

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NAVIGATION PLANNING

1.Assemble all materials

- Charts (current)
- Ruler
- Protractor
- Calculator
- POH
- Flight Computer
- Canada Flight Supplement (Current)
- Nav Log Forms
- Flight plan forms
- Pencils and eraser
- Weather information
- Notams

2. Select a routing

Consider:

- Recommended VFR route
- Terrain/Obstacles
- Most direct line
- Gliding distance from shore
- Alternate airports/services
- Distinct landmarks
- Ease of navigation
- Weather conditions
- Airspace restrictions/requirements
- Most populated route
- Precautionary/forced landing areas

3. Select an altitude

Higher Altitude:

- Can see further ahead
- Better Fuel Economy
- Faster True Airspeed
- Burn more fuel climbing

Lower Altitude:

- Can see landmarks clearly
- Not as much fuel used in climb
- Higher fuel burn in cruise
- Lower true airspeed

Consider:

- Weather
- Fuel consumption
- Airspace restrictions
- Terrain/Obstacles
- Oxygen requirements
- Gliding distance
- Cruising altitude orders

4. Select a set heading point

Consider:

- Distinct landmark
- Visible soon after take off
- Does not conflict with other traffic
- In direction of destination

5. Draw a track line

6. Measure distances-mark on nav log

7. Draw 10° drift lines

8. Pick checkpoints

Consider:

- Highly distinguishable
- Ideally a road intersection
- Not too large (i.e. a city)

9. Fill out nav log

- Altitude
- Temperature
- True Airspeed
- Indicated Airspeed (ICE-T)
- RPM
- True Track
- Wind
- Wind Correction Angle
- True Heading
- Variation
- Magnetic Track
- Magnetic Heading
- Groundspeed
- Distance
- Time
- Fuel Consumption
- Fuel for Taxi/T.O./circuits
- Fuel Reserve

10. Complete en route log

11. Complete aerodrome data box using Canada Flight Supplement (CFS)

12. Calculate take off roll and ground roll

13. Get another weather briefing-Has anything changed?

14. File a flight plan

Flight Preparation

Pre Flight:

Day(s) Prior:

1. A/C & Instructor Booked
2. Hours Remaining
3. Current Maps & Docs
4. Route Details
5. Frequency Log
6. Trip Request Complete
7. Nav Logs Prepped to 100% minus wind calculations / Fuel Burn / G/S
    - Top of Climb
    - Top of Descent
    - Aerodrome Call up Points
8. Wheels up time
9. Cancel if Wx not ok for flight

Day of Flight:

1. Complete Wx Package
    - METARS / TAFS
    - GFA - Wx / Cloud / Turb / Icing (FZ levels)
    - FD's
    - ATIS (if applicable)
    - NOTAMs for Entire Route including alternates
    - AIRMETS / SIGMETS / PIREPS
    - Night (DP Spread) / Sundown / Official Night
    - Call FSS

2. A/C Prep
    - Fuel / Oil (spare if needed) / Snags
    - Hours Remaining
    - Walk Around (keep tied down until you leave)
    - Deice
    - Clean Windscreen

- Survival Kit / Life Jackets / Tie Downs / Cargo Net / Extra Clothing

3. Briefing Room
   - W&B
   - Journey Log
   - All docs in pouch
   - Takeoff / Landing Calculations
   - Finish Nav log (winds / fuel burn / G/S)
   - CFS pages tabbed
   - Maps labled and organized
   - Signout sheet complete
   - Trip Request Complete
   - Flight Plan Filed

4.

Night starts at - :

Time to land - : (15 min prior to end of bkg)

Length of flight - :

Time to be wheels up - :

Time to walk out to the a/c - :

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CONSIDERATIONS:

Proper Planning and Preparation Prevents Poor Performance

Much like a computer, garbage in = garbage out. The accuracy of your cross country navigation is directly linked to the effort put into preflight planning. A detailed weather briefing, and thorough review of Notams is the first step in planning any cross country flight.

Care must also be made in assessing the destination aerodrome. Is the runway long enough? Are there obstacles on the approach? Do they have the fuel I need? Do they carry the oil I need? Are there tie down facilities? Is there a phone at the airport? Is there a taxi at the airport? Failure to consider these items can lead to a potentially dangerous or costly situation.

This checklist has been created to help pilots remember key points to consider before flying to a new aerodrome. Failure to consider some of these items can result in a potentially dangerous or costly situation.

- ❑ Prior permission required *(Some private/all military)*
- ❑ Runway surface *(grass or gravel must be approved by CFI)*
- ❑ Runway length
- ❑ Winter maintenance
- ❑ Elevation
- ❑ Circuit height
- ❑ Circuit direction *(non-standard are listed in CFS)*
- ❑ Radio frequencies
- ❑ Weather information available
- ❑ Notam file *(where Notams for this aerodrome will be listed)*
- ❑ Public facilities available
- ❑ Customs available
- ❑ Services available *(tie downs, hangars, etc...)*
- ❑ Correct fuel and oil available
- ❑ Fuel service hours of operation
- ❑ Aerodrome Procedures *(non-standard aerodrome procedures)*
- ❑ Cautionary notes *(potential hazards)*
- ❑ Noise sensitive areas

Taking the care to properly plan your cross-country flight will lead to less work in the air, and a more enjoyable flight with few unexpected surprises

Pacific Flying School

FLIGHT QUESTIONS

Documentation:

1. You will be pilot in command of today's flight, what will you do to ensure the aircraft you are taking is airworthy
2. What documents will not be carried on board the aircraft?
3. How long is the C of A valid?
4. How can you prove that the C of A is for this aircraft?
5. Besides the annual aircraft inspection report, what other inspections must be carried out on private aircraft? (... commercial aircraft?)
6. What are the differences between 50 and 100 hour inspections?
7. Can you tell me when the next inspection must be carried out on this aircraft?
8. What is the difference between airtime and flight time?
9. Of the two previous mentioned times, which one is the inspections based on?
10. Can you prove to me that the inspections have been completed on this aircraft?
11. What information appears on the C of R?
12. How long is the C of R valid for?
13. What happens to the C of R when the aircraft is sold?
14. What happens to the copies of the C of R during the selling of the aircraft?
15. May someone be able to rent a privately owned aircraft?
16. What does it take to renew the radio station license?
17. What must accompany your pilot license in order to validate it?
18. What are your privileges as a Private pilot? Commercial?
19. What would it take for you to f y an aircraft over 12,500 lbs?
20. What would it take for you to fly a multi-engine aircraft?
21. What are the requirements for a night rating?
22. What must one do in order to stay current for carrying passengers at night?
23. What must you do in order to fly a float plane?
24. What must you have in order to operate the radios in the aircraft?
25. How long is the restricted radiotelephone operator license good for?
26. Why must the POH be carried on board the aircraft?

27. Why could you not use your ground school copy?

28. When does the aircraft have to be re-weighed?

29. Can an aircraft be flown if the weight of the aircraft is slightly over-weight, but still in the C of G range?

30. Does an aircraft have to be re-weighed if it just had a paint job?

31. What procedure is to be followed when the journey log is full?

32. When must the journey log be carried in the aircraft?

33. What document at the flying club replaces some of the information in the journey log?

34. What other information is found in the journey log, (expecting to hear the compass swing and the LET information)?

35. How often must the compass be swung?

36. How often must the ELT be re certified?

37. How long are the batteries of the ELT good for?

AIRCRAFT PERFORMANCE:

38 What is the - normal climb speed?
Vne?
-normal descent speed?
-best angle of climb speed?
-best rate of climb speed?
-stall speed dirty?
-approach speeds (poh)
-maneuvering speed?
-fuel octane?
-indicated height for stall/spin? Vno?

39 What are the number of spark plugs?

40 What octane rating is the red fuel?

41. Is it acceptable for this aircraft?

42. What is the oil grade for this aircraft? (summer, winter)

43. What is the difference between detergent and mineral oils?

44. Can these two oils be mixed?

45. How long should mineral oils be used before detergent oils can be used?

46. What aerobatics are allowed?

47. Where is the shimmy damper?

48. What is the shimmy damper used for?

49. How are the radios cooled?

50. What is the maximum demonstrated crosswind component of your aircraft?

51. Calculate take-off distances?

52. Calculate landing distances?

53. Calculate W & B for both?

EMERGENCIES

54. What procedures are to be followed if an electrical fire occurs either on the ground or in the air?

55. What procedures are to be followed if a wing were on fire in the air?

56. What does one do if a circuit breaker "pops"?

57. What does this mean'.?

58. What can one do if there is a flap failure?

59. What does a low reading on the amp. meter or low voltage light indicate?

60. What can one do to fix this problem?

61. What would you do if during your flight you inadvertently encountered icing conditions?

62. Just as you lifted off, you noticed your left main tire went flat. What would you do in order to land this aircraft?

AIRMANSHIP:

63. Describe the symptoms of carb-ice?

64. When should carb heat be used?

65. What does the pitot tube measure?

66. What does the static port measure?

67. How would you calculate the obstacle clearance approach speed if the aircraft manual was not available?

68. What is standard temperature 1 5' C, decreasing 2' C for every 1 000 feet.

Know how - to get pressure altitude when you are given Altimeter setting.
- to compute density, altitude with flight computer.
- to do time, distance, and fuel problems with flight computer.
- to use Koch Chart.

Are winds true or mag in GA, Metar, TAF, FD, FSS, Tower.

KNOW DIFFERENT RADIO FREQUENCIES:

What are Unicom frequencies?

What is Emergency frequencies?

What frequencies do you monitor in uncontrolled airspace?

At Airfields where there is no Mandatory frequency or ground Station what frequency do you use?

TYPICAL FLIGHT TEST QUESTIONS:

69. What is the fuel consumption at (4000 feet with 63% power) standard temperature?

70. What is the take off run at maximum gross weight, at sea level, temperature 20 Celsius? Zero wind?

71 What is take off distance from a grass strip to clear a 50' obstacle at gross weight, 4000' airport elevation, 3 00 C, and at a 1 0 KT head-wind?

72. What is the landing distance over a 50'obstacle at 201 C, winds light? Your airport is at 2000'.

73. What are the procedures for short field take-offs and soft field take-offs and landings? (with or without obstacles).

74. If the temperature is 1 O' C and pressure altitude is 4000' with a TAS of 1 00 kts what is your IAS?

75. What is meant by a load factor?

76. How is the load factor affected in a turn at a constant altitude?

77. What does the "centre of gravity" mean to you?

78. How do you calculate the "moment"?

79. What is the maximum speed for lowering the flaps?

80. What is the horsepower of your aircraft?

81. Is this aircraft 12V of 24V system?

82. What does maneuvering speed mean?

83. How do you know if there is water in the fuel on a visual inspection?

84. What is the maximum flaps deflection in degrees, for your aircraft?

85. What is the standard weight for a male and female in the winter? In the summer? *If you don't know this where would you find it?*

86. If your pitot tube became blocked in flight how would your airspeed read if you started to climb?

87. How would you test your stall warning on the ground?

88. What does special VFR mean? How would you obtain this?

89. What does V.D.F. mean?

90. When is sunset? Sunrise? Official Dark? Twilight?

91. When should you not use the Flashing Beacon?

92. When can you use gasoline to clean a windshield?

93. What do you use to clean a propeller?

94. What is the maximum baggage to be carried in the baggage compartment?

95. During a take-off from a field above 3000 ft what should be done?

96. What is used to clean a windshield?

97. Why would you pull a propeller through before starting in cold weather?

98. How are the flaps operated?

99. What RPM do you carry out a magneto check?

100. While doing a mag check, you do not get a drop in RPM, this may be an indication of what?

101. Describe the fuel system on your aircraft.

124. What does the 80 and 87 mean in 80/87 fuel?

125. What octane fuel do we use here?

126. Explain transponder codes 1200, 1400, 7500, 7600, 7700.

127. Can a NORDO A/C enter a control zone? Why? Why not?

128. Where can a pilot find the exact magnetic bearing of a rwy?

129. Can a VFR pilot fly along a VOR airway?

130. What is the weather minimal along an airway for VFR traffic?

131. A NORDO A/C lands at an uncontrolled aerodrome that has only a pay phone, and the pilot has no money, how can he close his flight plan?

132. What does ARCAL stand for?

133. Explain the difference between an ATF and an MF.

134. A pilot wishes to fly to Lac LaBiche. How does he determine which VNC to use?

135. For flight planning purposes, what is PPR?

136. How do you determine distance on a map without using scale or plotter?

137. Explain the difference between VFR, IFR, and MVFR .

138. What problems are expected when using higher octane fuels for an extended period of time?

139. What is VFR weather minima for controlled airspace?

140. What is VFR weather minima for uncontrolled airspace?

141. What is the cost of customs services at Canadian airports?

142. Explain the differences between movement area, maneuvering area, and apron at airports.

143. Explain the differences between:
   a) indicated altitude
   b) pressure altitude
   c) true altitude
   d) density altitude

144. If the rudder pedal push rod boots are damaged or torn what would be the consequence?

145. How do you determine if your VNC is the latest edition?

146. Where is the highest elevation on a VNC given?

147. CF-XPJ, and A/C manufactured in 1965, has just been repainted. What must now be done with the plane?

148. What is a flight permit?

149. In controlled airspace, must a night VFR A/C have functioning landing light?

150. Must the A/C in question 59 have a 2-way radio?

151. What is the maximum IAS of a A/C in controlled airspace below 3000'AGL within 1 0 NM of a controlled airport?

152. On a single VFR flight plan with stops in Deer Lake, Stephenville, and destination Sydney, which airport(s) will be informed of your impending arrival by FSS?

153. What is the difference between flight plan, flight notification, and flight itinerary?

154. Is the en route altitude required on a VFR flight plan?

155. How far back from an airport with a control zone should initial radio contact be made?

156. What is a CVFR flight?

157. Must a pilot legally maintain a personal logbook?

158. What is VORTAC?

159. May landings be made at military aerodromes in Canada?

160. May a pilot use a restricted aerodrome?

161. What is an RCO?

162. What will long periods of idling cause?

163. When can the LET be checked for serviceability?

164. What is the position of the master switch when using external power?

165. What is the purpose of the fuel vent?

166. What is the MANOT?

167. Are the magnetos part of the electrical or ignition system

Aircraft Questions – Know this information for the aircraft you are flying on the test

168. What's the maximum gross weight in the normal category?

169. What is the maximum gross weight in the utility category?

170. What is the limit load factor in the normal category?

171. What is the limit load factor in the utility category?

172. What frequency does the ELT transmit on?

173. What colour is 100 LL avgas ?

174. Explain the procedure for dealing with an alternator failure.

175. What do you do if you lose fuel pressure?(if your aircraft has a fuel pump)

176. Explain (in detail) the procedure for engine power loss in flight.

177. How many degrees of arc do the wingtip lights provide projection through?

178. What airspeed correlates with the bottom (lowest speed) of the green arc?

179. How many tie-down rings are there? Where are they located?

180. Besides a maximum weight, what other criteria must be assured to comply with the utility category?

181. Why do we have to ground the aircraft prior to refueling?

182. Where is the intake air filter located?

183. Give five adverse affects that would affect flight performance with a centre of gravity beyond the rearward limit.

184. Under which wing is the pilot tube located?

185. Do you glide farther with a head wind or a tailwind?

186. Do you glide farther at gross weight or do you glide farther at a lighter weight?

187. A pilots remote switch: located inside the cockpit is provided to allow the emergency locator transmitter to be controlled from inside the cabin. What is the switch required to be set at while in flight? (know if your aircraft is so equipped)

188. Can we use an external power source to start? (know if your aircraft is so equipped)

189. Why shouldn't you taxi with the carburetor heat switch in the "ON" position?

190. Without the aid of a flight computer, how can we calculate our true airspeed while in flight?

191. Convert 69 degrees Fahrenheit to degrees Celsius.

192. What does a U.S. gallon of fuel weigh at -40 degrees Celsius?

193 You visually inspect the fuel tanks and note that both tanks are full. After startup, you notice one of the fuel gauges says empty. Is it okay to take off?

194. How many degrees arc is the nose wheel able to steer through?

195. What are the light signals in the air and on the ground?

196. Give examples of three places where we could find the serial number.

197. Why is there a down load of the tailplane during straight and level flight? Explain it's importance and advantage.

198 Are fuel and oil included in the licensed aircraft empty weight.

199 The anti-collision light is required to project a certain number of degrees above and below the horizon. Exactly how many?

200. You are on the ground at Boundary. Ground control gives you a current altimeter setting of 30.12, which you then set in the KOLLSMAN WINDOW. The altimeter needle says you are 150'ASL. Is there anything wrong here?

201. What is the purpose of the "live magneto check" during shutdown?

202. Explain the procedure for dealing with an open door in flight.

203. Your alternator has failed in flight, and you are on battery power. How long, on average, will it last?

204. A bug just splattered head first into the pitot tube opening. What indication will you get from the airspeed indicator during a descent?

205. As compared to climbing in a no-wind condition; what will change while climbing into a headwind, the rate of climb or angle or climb?

206. Explain the short field take off procedure with an obstacle. Would the distance increase or decrease while taking off from wet grass?

207. Why check the propeller for nicks or cracks? What would happen in flight with a chipped propeller?

208. What should you do if you don't get any oil pressure within 30 seconds after startup?

209. Where is the stall warning indicator/sensor located?

210. How many cylinders are there on your aircraft ? Is the engine 2 or 4 stroke? Liquid or air cooled? etc.

211. How many spark plugs are there per cylinder? Why?

212. Will a your aircraft run on Jet fuel? Why or why not?

213. Define density altitude.

214. Define pressure altitude.

215. The attitude indicator operates on the principle of

216. The top of the green arc (where the green arc meets the yellow arc) is called

217. An airplane at gross weight of 3150 Ibs. is flying in equilibrium, straight and level at cruise speed. The tail-down force in this condition is 256 Ibs. The lift required to fly in this condition is

218. The function of the static tube far as the airspeed indicator is concerned is to:

219. Do you glide further in the summer or winter assuming a no-wind situation?

220. What is the most important gas a pilot is concerned with?

221. Of the gyro instruments, which electric and which work off the vacuum pump?

222. What instruments are required to be on board an aircraft in order to fly a night? Day?

You are flying from Montreal to Quebec City. WN1e en route your Turn Co-ordinator and Heading Indicator become unserviceable. How would you determine your angle of bank to achieve a rate one turn if you are cruising at 1 10 mph? What about if you were cruising at 140 kts?

223. You are tracking inbound on the 130 degree radial. What is your heading in a no wind situation and what is dialed up on the Omni Bearing Selector?

224. You are tracking inbound on the 160 degree radial. You want to intercept the 205 degree radial inbound at an interception of 75 degrees. What is your heading to intercept and what is your heading upon interception of the 205 degree radial?

225. What do ADF and NDB stand for? Which one is in the airplane and which is on the ground?

226. What is the formula for determining Time To Station using VOR station or NDB?

227. Assuming you know your ground speed, how could you find out distance to station after using the formula in question # 1 4?

228. Assume you are tracking inbound to a VOR station on R-200. Your ground speed is 120 knots. You wish to determine your time and distance to the station. You turn the aircraft 90 degrees from r-200 and it takes 4 minutes 30 seconds to cross 1 0 radials (to the 190 degree radial). What is your time and distance to the VOR?

229. Fill in what is missing from the VOT Omnitest:

	OBS	CDI	TO/FROM	MAX ERROR
a)	(00)			
b)	090			
c)	180			
d)	270			

230. What is the formula used to determine Bearing To Station when using the ADF?

231. Determine the Track To Station where the relative bearing is 340 degrees and the aircraft is heading 260 degrees.,

232. Determine the track from the st ion if the aircraft heading is 085 degrees and the relative bearing is 165 degrees.

233. If your TO/FROM broke on your VOR and you had 1 00 dialed up on the OB S with the needle centered, how would you determine if you were tracking TO or FROM the VOR?

234. What does ATIS mean? What information is obtained from an airport that provides an ATIS facility?

235. What is meant by best rate of climb; best angle of climb and en route climb? Wha are the above speeds for you A/C?

236. How would you lean the mixture for Best Economy at cruise altitude? Do we normaly lean for Best Economy? Why? What is the advantage of leaning the mixture?

237. What does flight for range and flight for endurance mean?

238. What id the difference between normal and utility category? What category does you're A/C fall into?

239. What is the procedure for landing at an uncontrolled airport?

240. In the event you had a radio failure in area Cloverdale, how would you go about returnin for a landing at the airport?

241. What is the procedure for an engine fire in flight?

242. What is the procedure for an engine fire on start?

243. Ensure that you know how to use Canada Flight Supplement...

244. Know about the different types of airspace?

245. When checking the dates on VNC charts, what two places can you look to ensure the chart you are using is the most recent publication?

246. Ensure that you know the various traffic control light signals. Checklist. CFS.

247. Do you know the cruising altitudes appropriate to the aircraft track?
At what height does the cruising altitude order begin? For the domestic airspace within which you fly, is the cruising altitude based on magnetic track or true track?

248. Is there an increase of decrease in RPM when carb heat is applied? Why? What does it mean if the RPM does not move at all on the application of carb heat? What would be the definitive indication of the presence of carb Ice?

249. What can invalidate the C of A?

250. What can invalidate the C of R?

251. Briefly define the AAIR. What is required each year to validate the AAIR?

252. When doing a diversion, the heading you obtain from the VOR compass rose, is it a magnetic heading or a magnetic track?

253. How often are the aircraft at the Flying Club inspected?

254. What are the stall speeds of your A/C with and without flaps at gross weight? What is the significance of the stall strips on the leading edge of the wing?

255. Where is the battery in your A/C located?

256. What is the fuel usable and unusable?

257. What is the maximum allowable baggage in both baggage areas?

258. The cruising altitude is 4500' feet, altimeter setting is 29.72"Hg; what is the pressure altitude?

259. If you are cruising along at 4500' indicated, how can you find the pressure altitude without the use of a graph?

260. What is the procedure for requesting a direction find the pressure altitude without the use of a graph?

261. Ensure you know the proper technique for using your ten degree drift lines along your track when you are off course before the halfway point to the destination and past the half way point.

262. Runway in use is 29;W/V is 260/35. Use the cross-wind component chart to find the head-wind and cross-wind component. Is it safe to proceed with a take-off.

263. What are the speeds on the air speed indicator for the white arc, green arc, yellow arc and red line?

264. How many fuel pumps are in your A/C?

265. What is the procedure for doing a forced approach?

266. What is the procedure for doing an off-airport approach?

267. How do you recover from a spin?

268. Why must wings be level before pulling out of a spiral dive?

269. What is the procedure used to determine TAS while in flight?

270. What is the power off glide speed of your A/C?

271. What is the wing span of your A/C ?

272. What is the maximum RPM on the tachometer (red line)?

273. How many fuel drains are there for the fuel system on your a/c and where are they located?

274. Where is the alternate static source located and when would it normally be used?

275. What is the main restriction that must be observed when practicing spins?

276. How would you close a door in flight if one was to inadvertently become open in flight?

277. What are the visual indications in the cockpit that shows you have experienced an alternator failure in flight? How would you go about trying to rectify the situation?

278. What type of projection is the Vancouver VNC chart?
(How many miles is the equivalent of 500,000 inches?)

279 In the vacuum system, what is the normal vacuum reading in inches of mercury?

280. On a cross country diversion flight from Halifax to Debert, would you put the aircraft in flight for endurance or flight for range?

281. Ensure that you know the correct procedure for working out weight and balance?

282. On the six main instruments listed below for your A/C what source operates each instrument?

ASI	airspeed indicator
TC	turn coordinate
ALT	altimeter
AI	attitude indicator
HI	heading indicator
VSI	vertical speed indicator

283. What is the latitude and longitude of the highest elevation in the Vancouver VNC?
What is the height ASL and AGL?

284. What time period is your radio licence usually valid for?

285. How many days from the date of a satisfactory medical re-examination by designated medical examiner constitutes renewal of your medical until issue of a new licence validation certificate?

286. How many nautical miles are there in one degree of latitude?

287. Should the technical log for an aircraft eg. DIU be carried on board DIU in the event you are moving your base of operations?

288. When the letter "Y" precedes a station identifier (eg. YQM, YUL, YYZ, YFC)
What is it's significance?

289. How many pounds are there is a US gallon?

All applicants for the Private and Commercial licenses MUST READ Transport Canada's Flight Test Guide. Emphases must be given to procedures which will be used and the performances expected on the flight test.

When setting course at the beginning of a cross country, ensure your set course point is an easily identifiable landmark and far enough away from the departure airport to enable you to reach cruising altitude before setting course. Your first checkpoint should also be a prominent land feature.

When conducting a walk around on an aircraft prior to flight, you should release the hand brake and put the aircraft back to ensure the tires are not badly worn on the spot they are resting.

290. What are the hours of operation for the control tower at CYWL (Williams Lake)?

291. From the chart what is the height of the control zone for CYCD (Nanaimo) in ASL and AGE?

292. Know the different symbols for, VOR, VOR/DME, VORTAC and TACAN.

293. On the Vancouver VNC regarding Campbell River YBL the information contained in the rectangle is with regards to the beacon at 50 0.4N, 125 21.5'W .

What is the significance of the line underneath 203?
Is Campbell River Radio available on 126.7? How do you know this?

294. What is the procedure for a partial power loss that when power remains above power required for max endurance? What if in the partial power loss, the power goes below the power required for max endurance?

295. How often are GFACN's, TAF'S, and METAR'S, and FDCN's issued and what are their validity periods?

296. In GFA's when are winds and visibility included in the forecast?

297. In an FDCN at the 3000 ft. Level, what does 9900 mean?

298. Each candidate is expected to obtain and know how to read and interpret GFA's, TAF'S, METARS, and FD as they relate to the route of your planned cross country for the flight test. All NOTAM's relevant to your planned route must be obtained prior to your ground work.

299. When on a cross country from CZ3-YQX, you experience a corn failure just outside Gander control zone. What do you do?

The answers to the above questions should be understood by all Private and Commercial students in preparation for ground work prior to the flight test. These questions are only a guide. This is not a format of every possible question that may be asked by a Designated Flight Test Examiner.

CHECKLIST FOR SPP AND PPL

STUDENT PILOT PERMIT:	**Instructor's Signature**
2 copies Valid Passport/Birth Certificate/Citizenship Card	
Photocopy of Valid Medical	
Presolo Examination corrected to 100%	
Presolo Examination signed by student & instructor	
All Presolo Air Exercises Completed & Initialled in PTR	
PRIVATE PILOT LICENCING:	
PTR Dual & Solo hours balance to Licencing Application & Logbook	
3 hours Dual Cross Country	
5 hours Solo Cross Country	
5 hours Instrument Time	
At Least 2 Hours Instrument Time In Aircraft	
12 Hours Solo	
All Air Exercises Demonstrated - Check Illusions	
Application for Flight Crew Licence Completed	
Photocopy of Written Examination Results	
Application Signed by Student in Part A & Part D (8)	
Groundschool entered in PTR	
Each page of PTR signed by Student & Instructor	
Original Medical & Student Pilot Permit	

Pilot Information

How is air traffic control different with the Pitt Meadows and Langley control zone airspace as Class C?
When the control tower is open, VFR flights require a clearance from the tower to enter the control zone.

What happens to the Class C control zone when the tower is closed?
Airspace classified as Class C becomes Class E airspace when the tower is not in operation. When the airspace is Class E, a transponder is not required. At Pitt Meadows and Langley, Mandatory Frequency (MF) communications are in effect when the tower is closed.

What equipment is needed to fly in the Class C control zone?
A person operating an aircraft under VFR in Class C airspace shall ensure the aircraft is equipped with a transponder with automatic pressure altitude reporting (Mode C) and a radio capable of two-way communication with the tower.

What if my radio fails when in the control zone?
Where there is a two-way radio communication failure between the tower and a VFR aircraft while operating in the Class C control zone, the pilot shall set the transponder code to 7600 and land at the airport following NORDO procedures and as directed by the light signals provided by the tower (Steady green light = Cleared to land. Steady red light = Give way to other aircraft and continue circling. Series of green flashes = Return for landing.)

What if my radio fails outside the control zone while inbound for landing?
If it is not practicable to land at an alternate uncontrolled aerodrome, the pilot should set the transponder code to 7600 and if able call the tower by cell phone using the emergency number for the tower published in the CFS (As published October 2007, CYPK – (604) 465-9723, CYNJ – (604) 534-9443). Otherwise, the pilot should land at the airport following NORDO procedures and as directed by the light signals provided by the tower.

What if my aircraft is not equipped with a transponder?
Class C is designated transponder airspace and it is required by regulation that the aircraft is suitably equipped. Limited options are available as detailed below for a non-functioning transponder.

What if my transponder fails when in the control zone?
If the aircraft's transponder fails, the pilot can choose to land at the airport or proceed to an alternate aerodrome that is not in transponder airspace for repairs.

What if my transponder fails when outside the control zone?
If airborne and the transponder fails, the pilot may request a clearance into the zone for landing with the control tower. Permission to enter the zone may be granted, controller workload permitting. If the transponder is unserviceable prior to departure, the pilot must contact the tower by phone for permission to enter the zone.

FROM THE TOWER

Ways to help improve the process:

1) On initial contact, say everything you need to say in your first call and be concise. We need to know who you are, where you are and what you want. For example "Cessna 172 GAMG at the trestle 1500 landing with Echo." or "Cessna 172 GMAT at Montair taxi for flight plan to Chilliwack with Bravo." If you are going south or west add in your planned altitude so we know whether to switch you to tower or terminal after departure.

2) Make your position reports as accurate as possible. If you are 2 or 3 miles back from the trestle don't say you are over it. Other aircraft that may be over the trestle will start to look for you and we will waste time radar identifying and passing traffic that may not be necessary.

3) Don't call too far away - trestle, Point Roberts or any point that is not more than 8 or so miles from the airport.

4) Familiarize yourself with the published arrival/departure routes; they were implemented to aid in separating aircraft. It's not a good idea to report over the trestle inbound when we are using it as the outbound route.

5) Don't report clear of the control zone. We can see on radar when you are clear. This will help reduce frequency congestion.

6) If you are on a flight plan you must advise the ground controller (not the airport controller) when you taxi. We don't receive any information from Flight Service on flight plans and so won't know you are on a plan unless you tell us - we will be happy to open, close or revise your plan on request.

7) When you land and exit the runway, make sure you taxi well off the runway. There may be other aircraft close behind you who will also need to exit. This is especially important on taxiway Bravo.

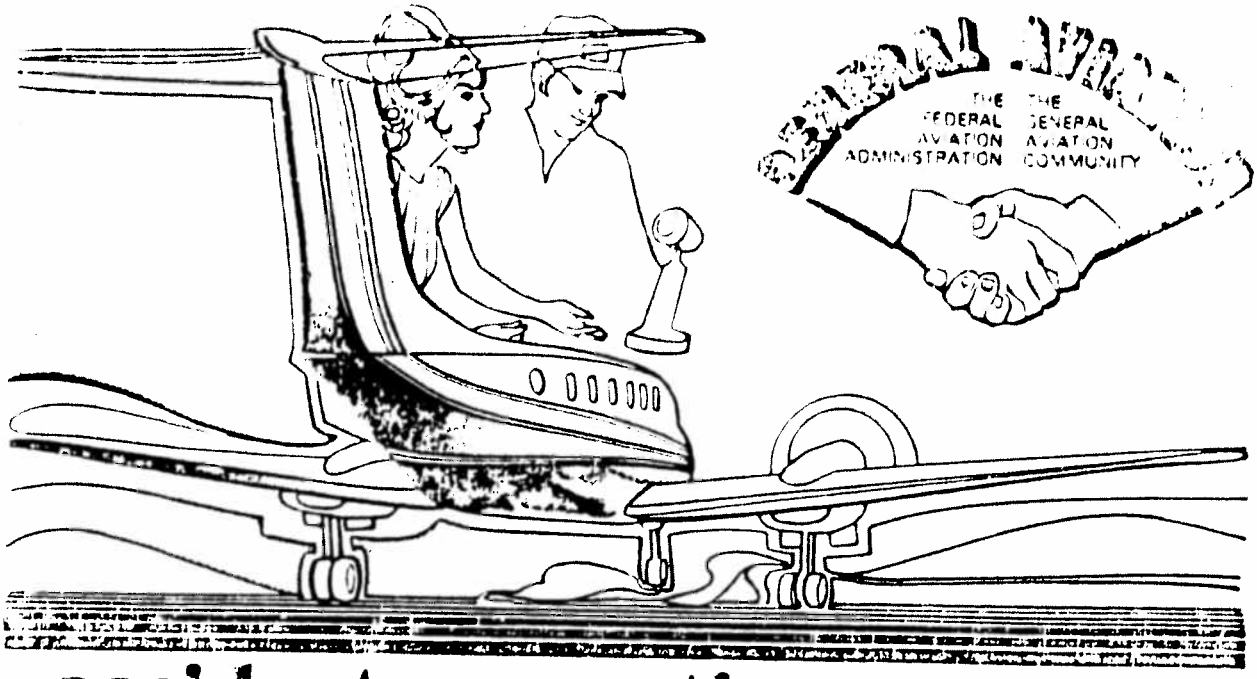
8) Maintain a continuous listening watch on the frequency. This is a busy airport and the circuit is usually kept fairly tight to accommodate arrivals and departures. If we need you to do something and can't raise you on the radio, you are inconveniencing everyone else in the circuit and may be jeopardizing your own safety.

9) Boundary Bay control zone is surrounded by class C airspace. Make yourself familiar with the surrounding airspace and altitudes and conduct your flight accordingly. That means either contact the appropriate agency (usually terminal) or avoid the airspace.

10) **PLEASE DO NOT READ BACK ANYTHING BUT A HOLD SHORT RESTRICTION OR IFR CLEARANCE.** There seems to be an epidemic of VFR readbacks which greatly increases frequency congestion. You need only reply to a clearance or instruction with your ident to indicate acceptance. If you cannot comply advise us immediately. For example if given an immediate take off clearance and you are unable to make an immediate departure, simply say "unable an immediate". Conversely, if you are asked to "keep the speed up" and acknowledge that transmission, the controller is basing separation on your compliance with that instruction. If you then do not comply you or other aircraft may be inconvenienced or put at risk .

11) Please remember our neighbours at Delta Airpark. The minimum altitude over Delta is 1000 ft. When you are clear of Delta's airspace you may descend to circuit altitude.

FAA-P-8740-03
AFO-800



accident prevention program

ON LANDINGS

PART I

U.S. Department of Transportation
Federal Aviation Administration
Washington D.C.

FOREWORD

The purpose of this series of publications is to provide the flying public with safety information that is handy and easy to review. Many of the publications in this series summarize material contained in FAA General Aviation Accident Prevention Program audio-visual presentations. Each of the three "On Landings" handouts (Part I, Part II, and Part III), contains material intended to supplement the "On Landings" audio-visual presentation.

Comments regarding these publications should be directed to the Department of Transportation, Federal Aviation Administration, General Aviation and Commercial Division, Accident Prevention Program Branch, AFO-810, 800 Independence Avenue, S.W., Washington, D.C. 20591.

Acknowledgement

Handout preparation "thanks" go to William K. Kershner, technical advisor, Drew Steketee and Cassandra John, writing and editing, James Gross, illustrations and graphics, layout and design, Gary S. Livack, overall project coordinator, and Ken Johnson, executive producer. Additional copies of this handout are available from any FAA Flight Standards District Office.

A Cooperative Project by the:

AVCO Lycoming Williamsport Division
Federal Aviation Administration
General Aviation Manufacturers Association
Transport Canada

ON LANDINGS
Part I

Being a safe pilot means combining your working knowledge of aviation with current skills and experience—tempered by good judgment.

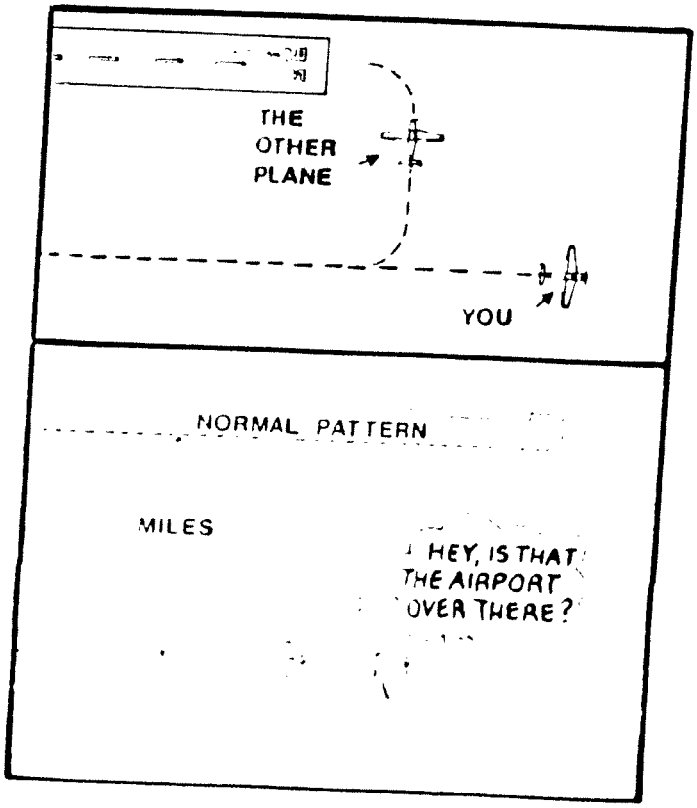
One important phase of flying skill is the landing. Landing phase accidents are responsible for nearly half of all general aviation accidents. By fortifying your knowledge of the "whys" and "wherefores" of approach and landing accidents, you can become a safer pilot.

In this handout we'll look at undershooting and cross-control stalls—the kinds of accidents which can happen *before* you reach the runway. Also, we'll look at hard landings, porpoising, and loss of directional control—problems encountered *after* reaching the runway.

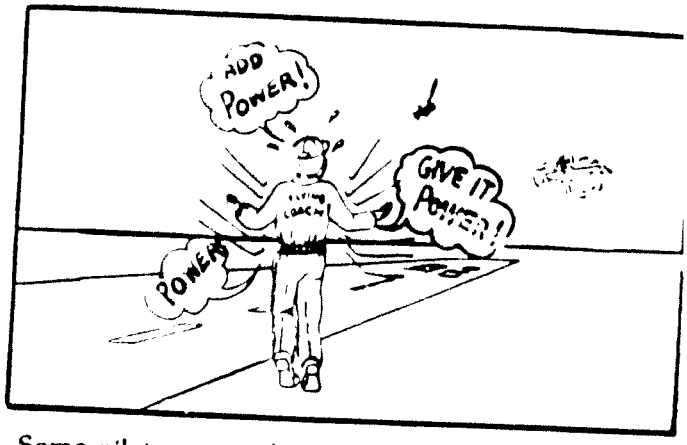
THE UNDERSHOOT

At one time or another every one of us has miscalculated an approach and started to undershoot the runway. It's hard to forget that "sinking" feeling you had when you first realized that the airplane might not make the runway.

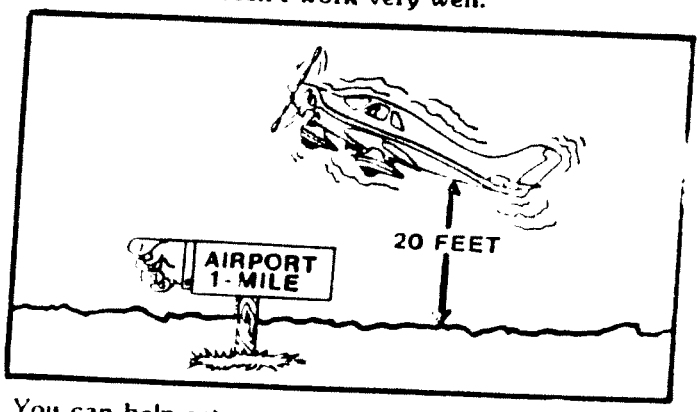
Poor pattern techniques such as flying too wide a pattern on downwind, or making a late turn to base leg are frequent causes of undershooting.



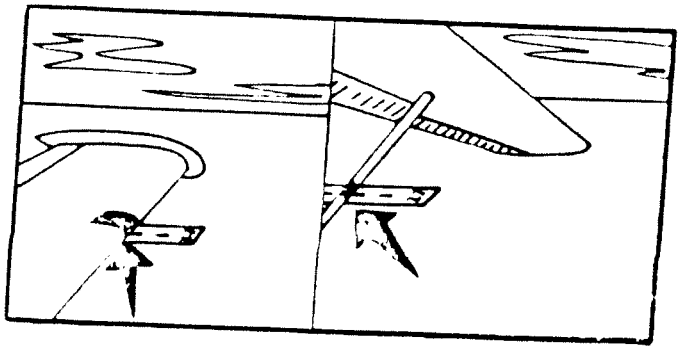
Another cause is failure to maintain adequate power on final.



Some pilots succumb to "runway fixation" and unconsciously try to "carry" the airplane up to the landing spot by easing the nose up without adding power—this doesn't work very well.



You can help set up a proper and constant distance from the runway for *all* airports by placing the runway centerline at a specific point on the leading edge of the wing (low wing airplane) or a point along the strut (high wing airplane). You may even put a mark or piece of tape at the proper wing strut position.

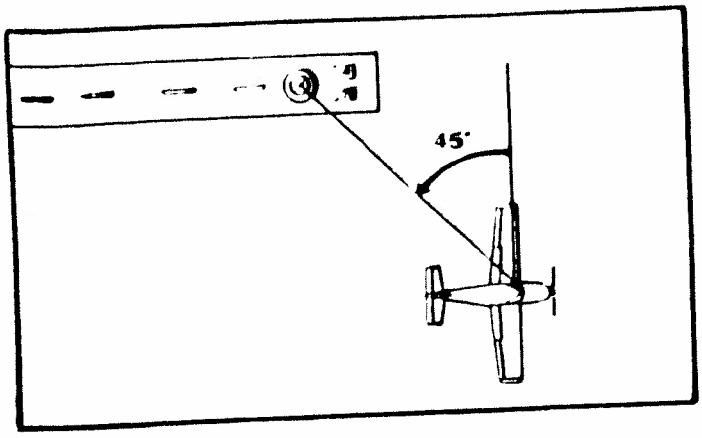


Using the runway centerline as your guide takes care of wide or narrow runways. (Of course, this reference line or point only works when the wings are level.)

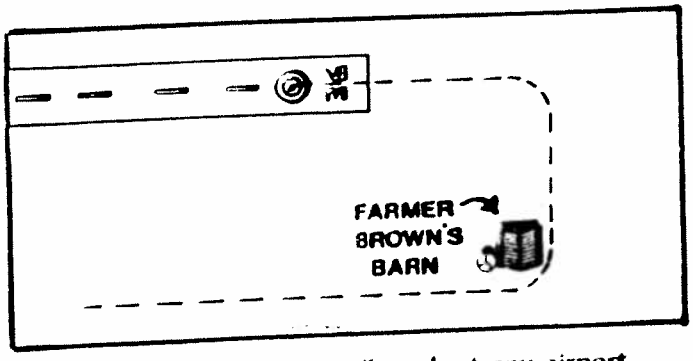
Avoiding Undershoots

How do you avoid undershoots? A good pattern helps.

When traffic isn't a factor, turn base when the point of intended touchdown is 45 degrees behind the wing.



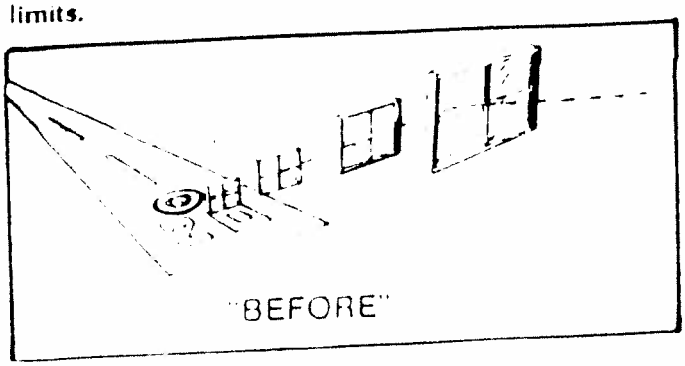
At a familiar airport, you may be able to use the "crutch" of familiar landmarks to determine proper turning points. But at unfamiliar airports you won't have such "hometown" references.

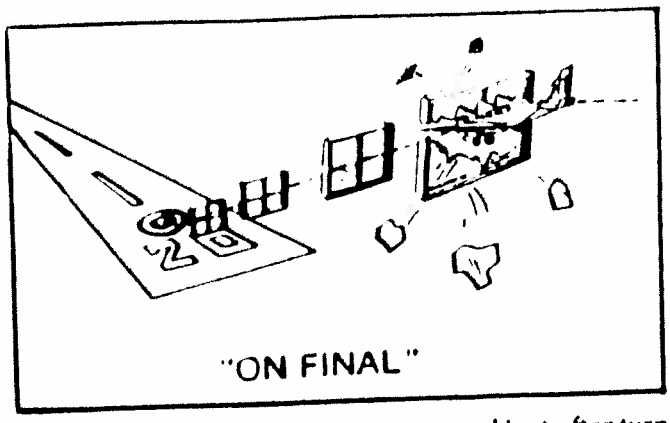


The 45 degree technique will work at *any* airport.

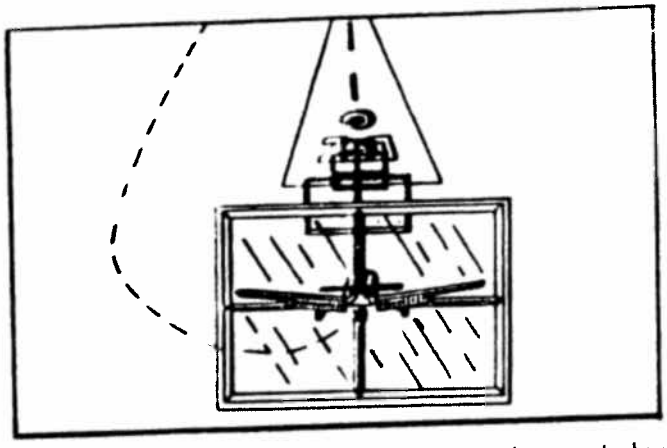
When there is other traffic in the pattern, you can avoid the common problem of the "ever-lengthening downwind" by starting your turn to base just after the airplane you're following turns final and passes behind your wing (assuming that it's not using a much slower approach speed than yours).

Experienced pilots often use a series of imaginary windows on approach. These "reference points in the sky" are great aids in determining whether your approach is within the desired horizontal and vertical limits.

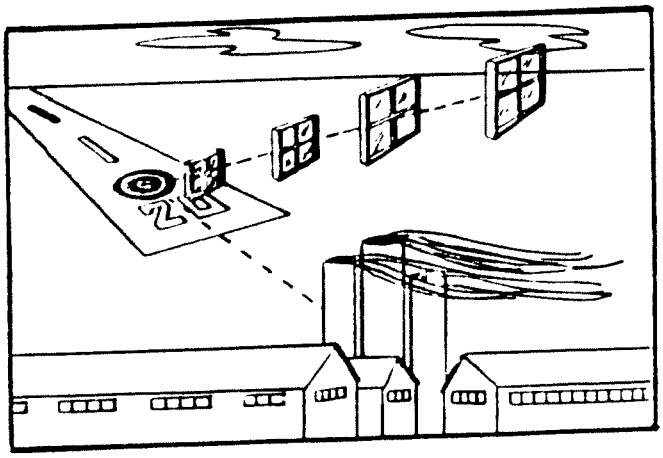




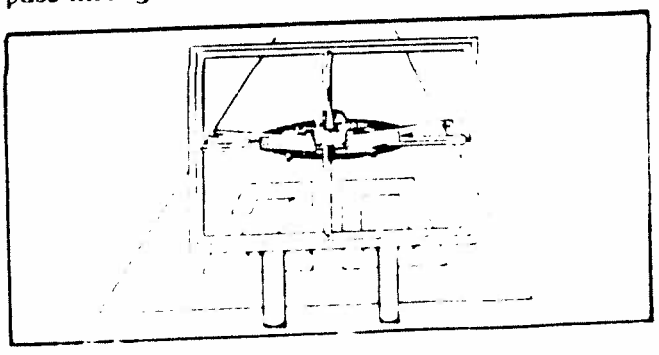
The first window should be encountered just after turning final.



If there are obstacles between your imaginary window and the runway, either raise the "windows" or move them.



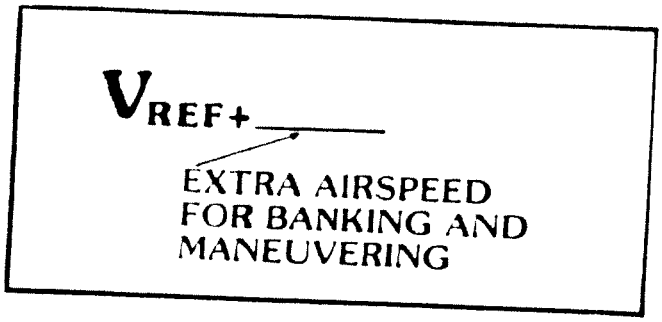
Your last and most important window is the one at the runway threshold. You should be at the required airspeed and height to complete the landing when you pass through this last window.



Flying the Right Airspeed

Pilots of large aircraft always determine what their approach speeds will be in advance. They calculate the aircraft's landing weight, then look at charts for the right "reference speed, " or V-ref. The keystone V-ref, although different on almost every approach, is based on the airplane's stall speed and other factors at its estimated landing weight.

Added to V-ref by the pilot is additional airspeed required to maintain an adequate safety margin while maneuvering in the pattern as well as additional airspeed to compensate for wind gusts, turbulence and wind shear.



"Approach segment airspeeds," based on V-ref, assure that the aircraft has just the right amount of extra airspeed margin above V-ref.

Smaller aircraft do not come with V-ref tables. Some manufacturers, however, furnish recommended approach speeds corresponding to different aircraft weights.

Such tables can be developed and it is suggested that you prepare and use your own. We recommend that you use the format in the following table, but before you fill it in, we suggest that you see Part II of "On Landings", and read the accompanying handout for Part II carefully.

(CUT OUT ALONG DOTTED LINE)

V-SPEEDS

LANDING WEIGHT _____

	KNOTS IAS
PRE-PATTERN	
DOWNWIND	
BASE	
FINAL	
SHORT FINAL	

There are rules-of-thumb, however:

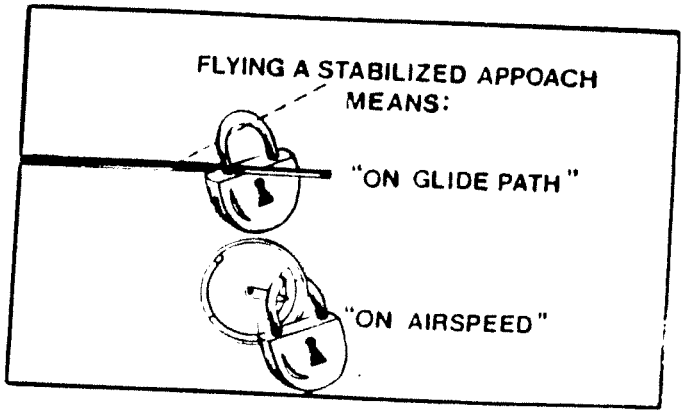
1. On downwind, fly no faster than the "top of the fla operating range" and no slower than 1.4 times th calibrated stall speed for your airplane at its actu landing weight, or 1.4 Vso. (There are exceptions so please read Part II.)

2. Maintain an airspeed no lower than 1.4 Vso unti after turning final.

3. Then, on final, let your airspeed decay to 1.3 Vso as you near the runway.

4. If you encounter any turbulence, wind gusts or wind shear, compensate with additional airspeed on each segment of the approach.

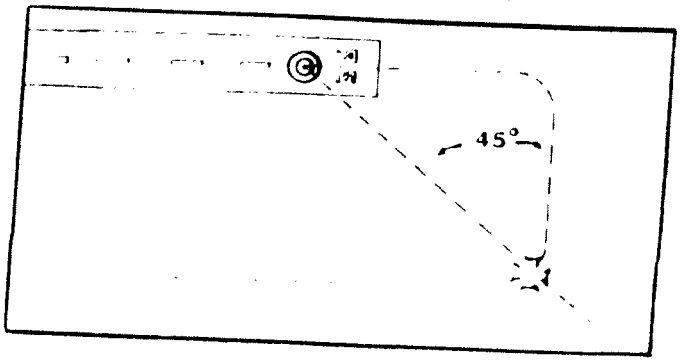
The Stabilized VFR Approach



Make your normal pattern entry and extend your landing gear on downwind, if applicable. Abeam the intended landing point, reduce your power to the predetermined value that works best for your airplane. While holding altitude with pitch, slow the airplane down in preparation for turning base.

Then set partial flaps, if you haven't already done so. If you have reduced power properly, you can now trim the aircraft and set up a descent.

Begin your turn to base when the point of touchdown is 45 degrees behind the wing. Turn base, then final, keeping all banks to 30 degrees or less.

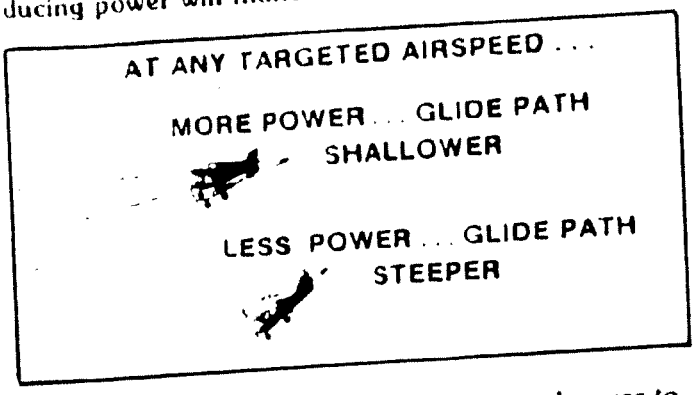


Should you need to increase your rate of descent, do so either by reducing power or by further extending flaps to increase drag. If you do extend flaps, remember that you've just modified your approach configu-

stay on the selected glide path at your targeted speed.

A fundamental key to flying a stabilized approach is the inter-relationship of *pitch* and *power*.

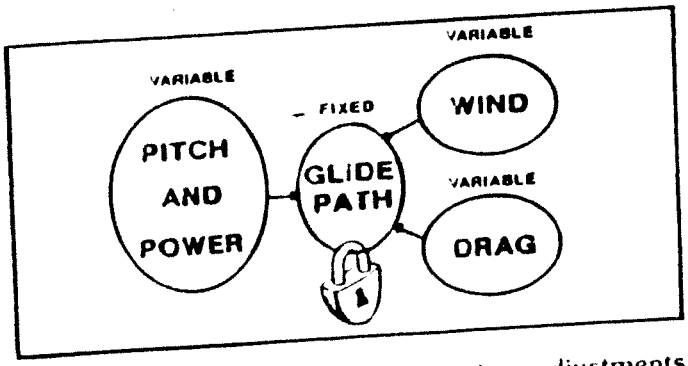
At any targeted airspeed in any configuration, adding more power will make the glide path shallower; reducing power will make it steeper.



This inter-relationship means that any changes to one element in the "approach equation" must be compensated for by adjustments in the other.

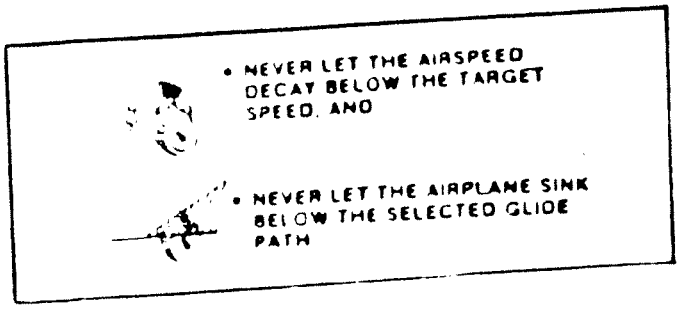
So, after a glide path has been selected, the means of staying on it *and* maintaining your targeted airspeed can only be achieved by adjusting pitch and power together.

Experienced pilots know the power settings and airspeeds for different landing weights, drag configurations and rates-of-descent for their airplanes.

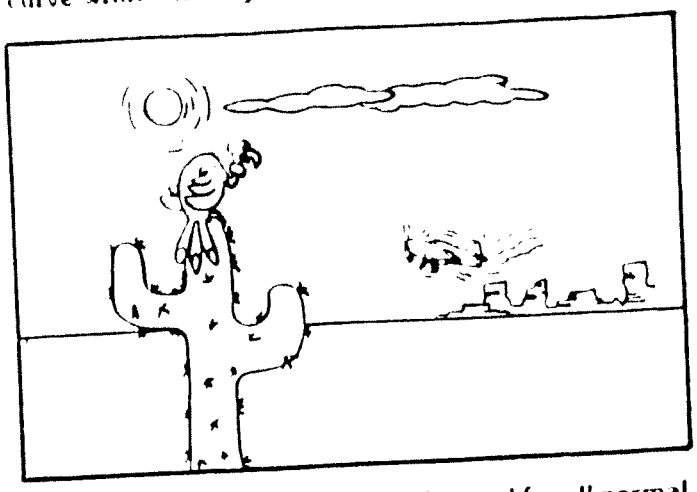


Then, these pilots need only make minor adjustments to pitch and power to maintain the selected glide path and airspeed.

The important (if not basic) point is *never* let your airspeed decay below the targeted airspeed for each segment of the approach and *never* let the airplane sink below its selected glide path.



In any event, never let yourself get behind the power curve while on long final!

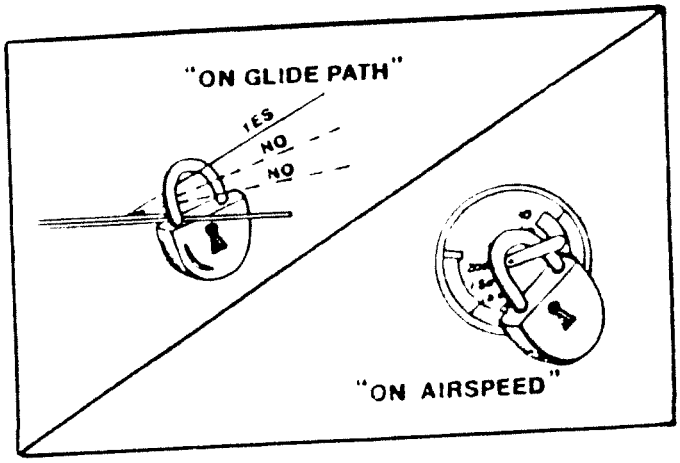


One final point: full flaps should be used for *all* normal landings unless the manufacturer suggests otherwise. And, once flaps have been extended, they should not be retracted. That's why it is always good practice not to go to the final flap setting until your landing is assured.

The Stabilized IFR Approach

The same basic concepts apply to the IFR approach. First, transition the airplane to the approach configuration, that is, slow the airplane and retrim it. Do this well before you intercept the glide slope, unless traffic flow requires otherwise.

Some pilots extend their landing gear to help them slow down, then add flaps after the airspeed drops into the flap operating range. If the gear has not already been used for speed control, extend the gear as you intercept the glide slope or reach the final approach fix. Additional power may be necessary with the gear and flaps extended. Be sure to retrim for each configuration change.



You should now be able to hold the selected airspeed and set up a stabilized rate-of-descent. With the runway in sight, and a landing assured, extend final landing flaps. Retrim again and maintain positive control of the aircraft, since adding flaps without promptly retrimming could possibly cause you to "balloon" back into the clouds.

A RULE-OF-THUMB TO CALCULATE RATE-OF-DESCENT

One Technique:

Glide Slope	Factor × ground speed (knots)	=	Your approximate rate-of-descent (feet per minute)
3°	5 × _____	=	_____
4.5°	8 × _____	=	_____
6.0°	10 × _____	=	_____

Example:

3°	5 × 90 knots	=	450 feet per minute
	(Chart value . . . 480 feet per minute)		
4.5°	8 × 90	=	720 feet per minute
	(Chart value . . . 715 feet per minute)		

Another Technique:

$$\frac{\text{Ground speed (in knots)} \times \text{"0"}}{2} = \text{Your approximate rate-of-descent for a 3° glide slope } \textit{only}.$$

Example:

$$\frac{90 \times \text{"0"}}{2} = \frac{900}{2} = 450 \text{ feet per minute}$$

(Chart value . . . 480 feet per minute)

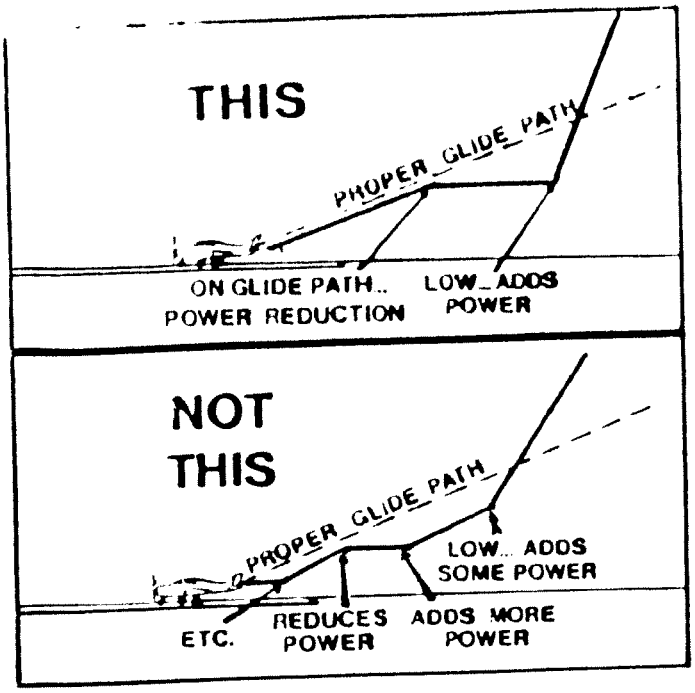
RATE-OF-DESCENT TABLE[1]

INSTRUMENT APPROACH PROCEDURE CHARTS
RATE OF DESCENT TABLE
(ft. per min.)

A rate of descent table is provided for use in planning and executing precision descents under known or approximate ground speed conditions. It will be especially useful for approaches when the localizer only is used for course guidance. A best speed, power, attitude combination can be programmed which will result in a stable glide rate and attitude favorable for executing a landing if minimums exist upon breakout. Care should always be exercised so that the minimum descent altitude and missed approach point are not exceeded.

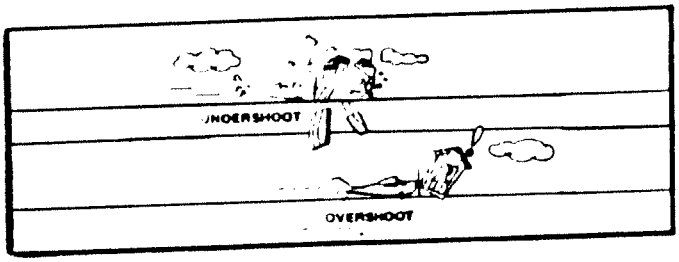
ANGLE OF DESCENT (degrees and tenths)	GROUND SPEED (knots)										
	30	45	60	75	90	105	120	135	150	165	180
2.0	105	160	210	265	320	370	425	475	530	585	635
2.5	130	200	265	330	395	465	530	595	665	730	795
3.0	160	240	320	395	480	555	635	715	795	875	955
3.5	185	280	370	465	555	650	740	835	925	1020	1110
4.0	210	315	425	530	635	740	845	955	1060	1165	1270
4.5	240	355	475	595	715	835	955	1075	1190	1310	1430
5.0	265	395	530	660	795	925	1060	1190	1325	1455	1590
5.5	290	435	580	730	875	1020	1165	1310	1455	1600	1745
6.0	320	475	635	795	955	1110	1270	1430	1590	1745	

[1] This table has been adapted for training purposes only, from a similar table published in the United States Government Instrument Approach Procedure Charts, National Ocean Survey, U.S. Department of Commerce



What if Things go Wrong on the Approach?

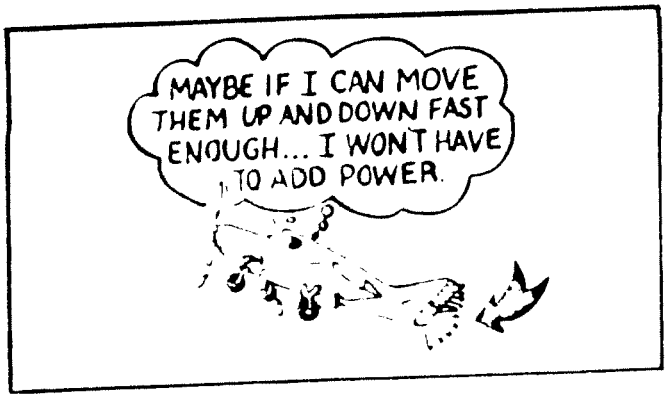
You should be interested to know that accidents involving undershoots are usually much more serious than landing long. Obviously, the energy levels involved in undershoot accidents are much higher.



If ever you're in doubt about making the runway, add enough power to assure a safe landing. And, of course, be sure that power will be available by using your checklist for all pre-landing items! A significant number of landing accidents are caused by loss of power, and many of them are related to some basic step the pilot simply forgot.

What's the Cause of Most Undershoots?

Often the pilot is unconsciously trying to hold altitude or make the runway using elevator alone.



This sets up a mush or stall, resulting in an undershoot accident, or a hard landing on the runway itself.

A perfect way to sucker yourself into this is to shoot a long, low approach—especially in unstable air or in high density altitude conditions.

What can happen is that you can wind up behind the power curve with the throttle wide open and no more power available to stop the sink rate.

In this case the only thing you can do to save the situation (tough as it is) is to *ease* the nose over and regain airspeed and climb capability—if you've got the altitude, distance, and lack of obstacles ahead to do it. This only reemphasizes the importance of using the proper *combination* of power and pitch throughout the landing approach.

Undershooting—The Key Points

—Know and use the appropriate approach speeds;

—Never allow yourself to get below your targeted approach speed for each segment of the approach;

—Fly the proper glide path;

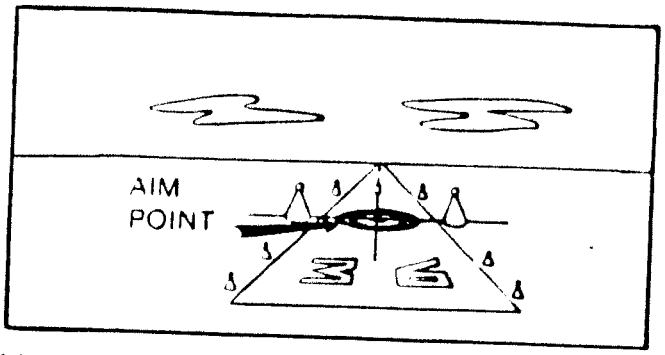
—Add power *anytime* you think you're too low or slow; and

– Remember the inter-relationship between pitch and power.

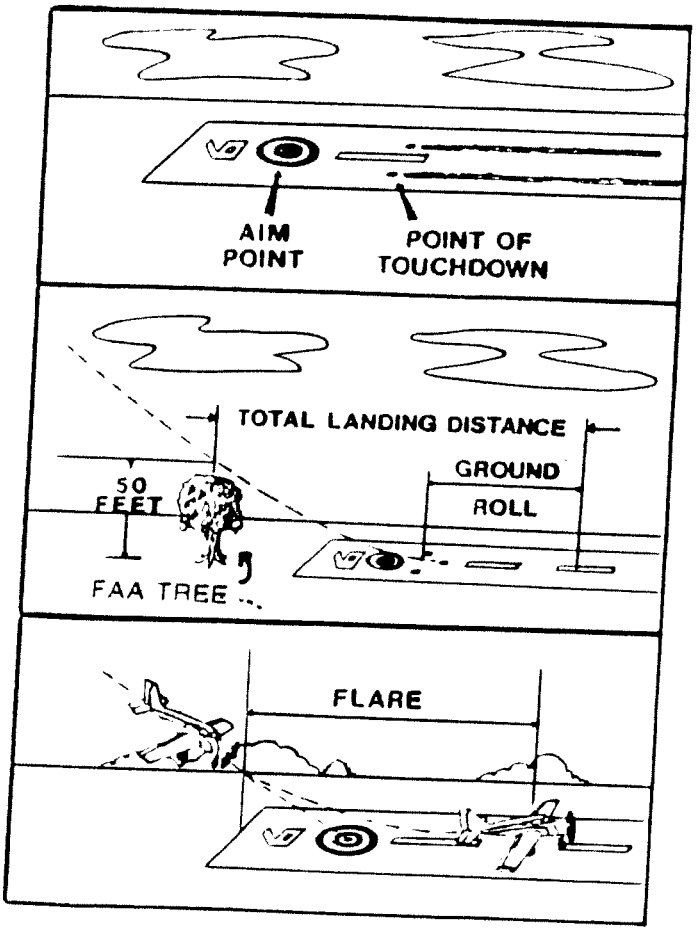
THE AIM POINT

The aim point is something we've all heard about but may not have been using. But it's a great aid in making good, safe landings.

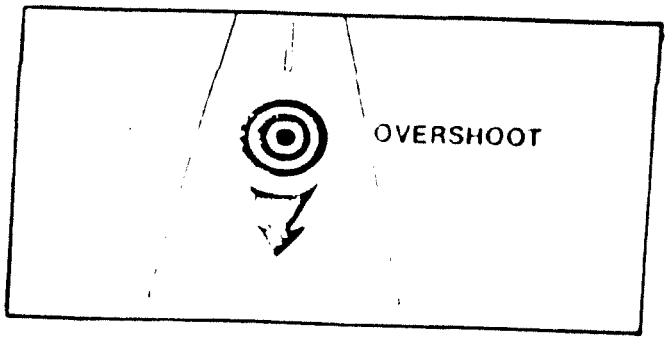
The aim point is your imaginary bulls-eye on the runway. It can be between two particular runway lights, or wherever.



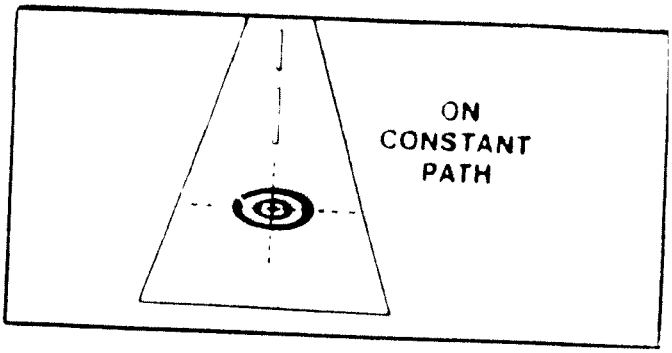
It's the reference point at the end of your selected glide path, *not* the actual touchdown point.



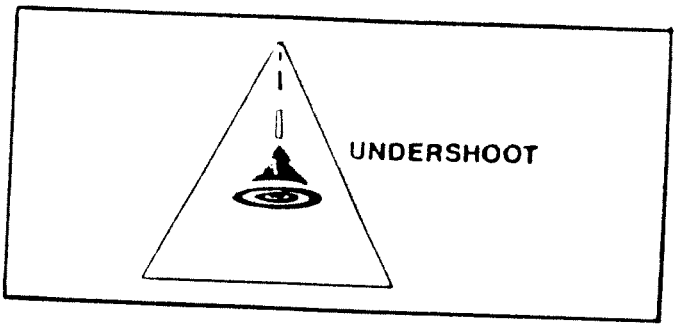
If your aim point appears to be moving *toward* you when you're established on final, you know that your airplane will overshoot that point.



A *constant* position of the aim point in your windshield means things are "right on."

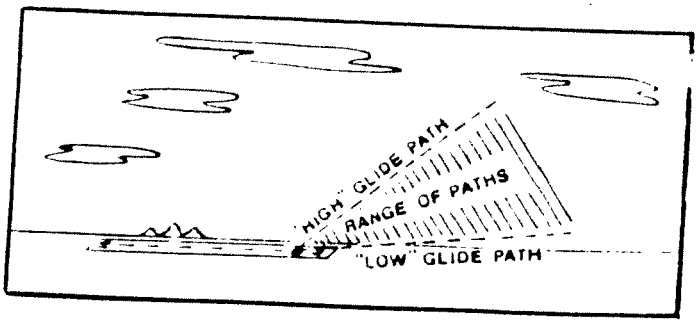


If the aim point appears to be moving *away from* you it's a sure sign of an undershoot.

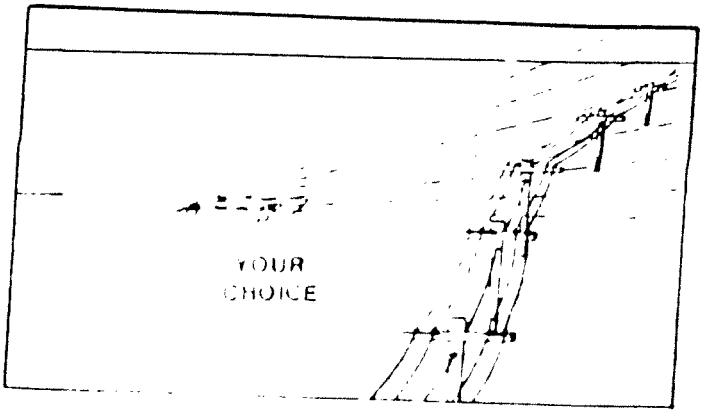


GLIDE PATH SELECTION

Once you've selected your aim point, you must also select the right glide path. Without a Visual Approach Slope Indicator (VASI) or Instrument Landing System (ILS), this becomes a personal decision.



Select a glide path that works best for a particular situation, but make sure it allows for clearance of all obstacles and for a *safe* rate-of-descent.



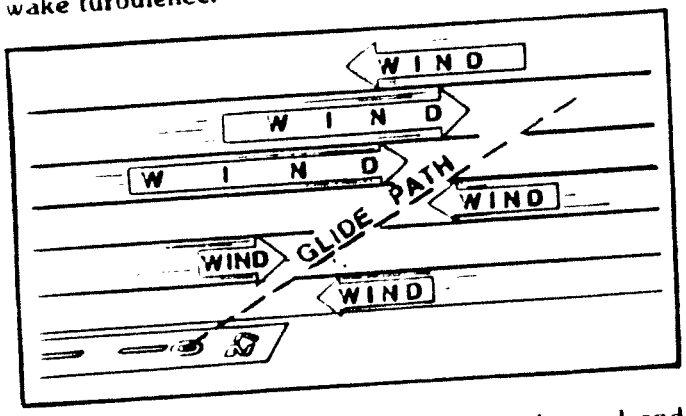
A VASI is a good aid to help establish a safe glide path. Remember, though, that while all VASIs will keep you clear of obstacles, approach angles vary. And some "complex" VASIs provide multiple approach angles to assist everything up to jumbo jets, while many smaller airports may have only non-standard VASI systems. One such non-standard system is nothing more than three plywood (or plastic) panels to be aligned by adjusting your glide path on approach.

The *Airman's Information Manual* provides a detailed description of how standard and non-standard VASIs work. Additionally, the *Airport Facility Directory* provides VASI glide angle information for standard VASIs for each runway where they are installed.

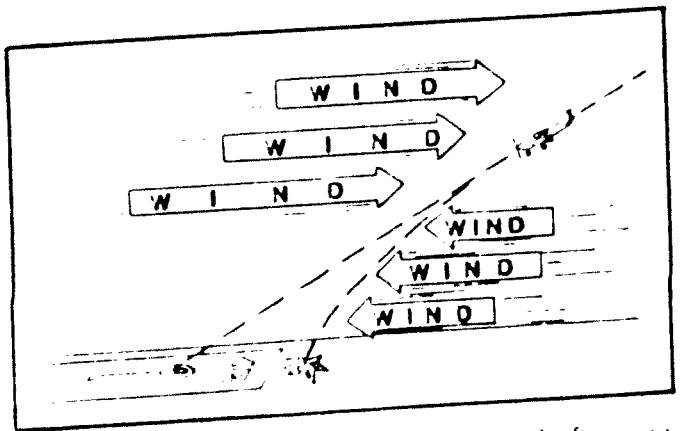
In Canada, comparable references are the *Aeronautical Information Publication-Canada (AIP-Canada)* and the *Canada Flight Supplement*.

WIND AND TURBULENCE CAN AFFECT THE GLIDE PATH

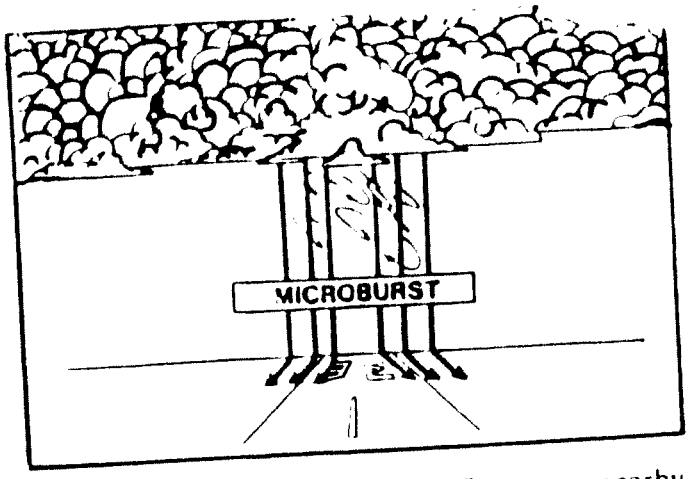
On final, your glide path can be affected by wind, wind shear, microbursts and other turbulence, including wake turbulence.



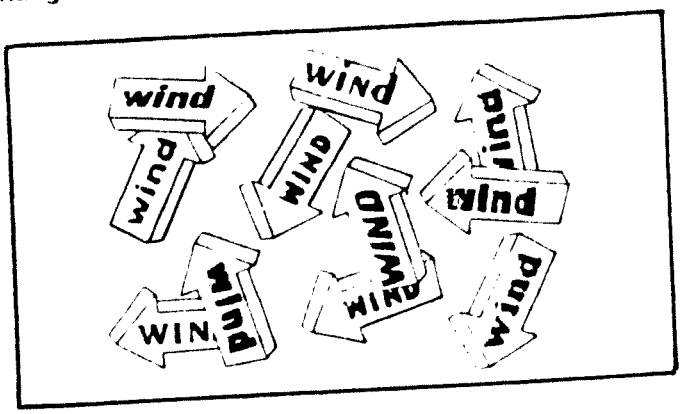
Wind shear is a major variation in wind speed and direction between *horizontal* layers of air.



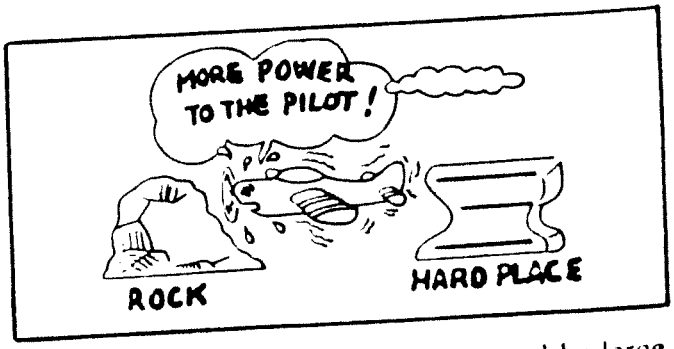
Microbursts are sharp, very strong downdrafts, associated with thunderstorms. Impossible to outmaneuver and usually invisible to the eye, they are good reasons to avoid a landing at any airport with a



Turbulence also results from airflow over nearby mountains and winds disrupted by nearby woods, hangars or other airport structures.



Always be ready for turbulence and its effect on your approach. When you find it, especially on short final, be prepared to add power and go-around if necessary. The sooner you add power, the less likely you are to wind up between a rock and a hard place.

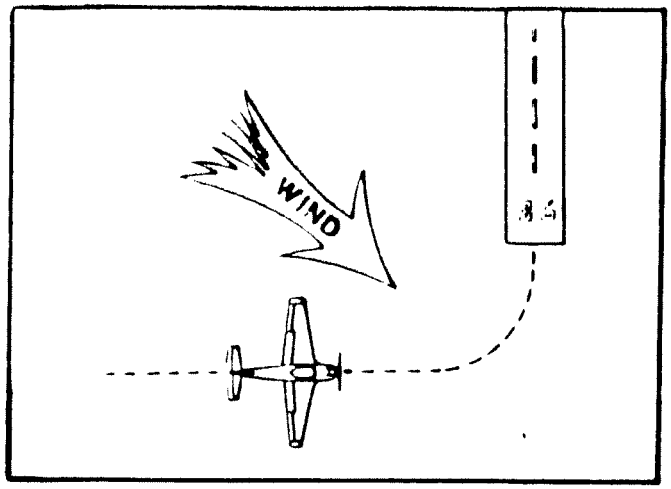


Whenever you operate at an airport served by large aircraft, be alert for wake turbulence. Study the wake turbulence avoidance procedures from time to time. They, too, are published in the *Airman's Information Manual*, the *AIP-Canada*, and in other publications.

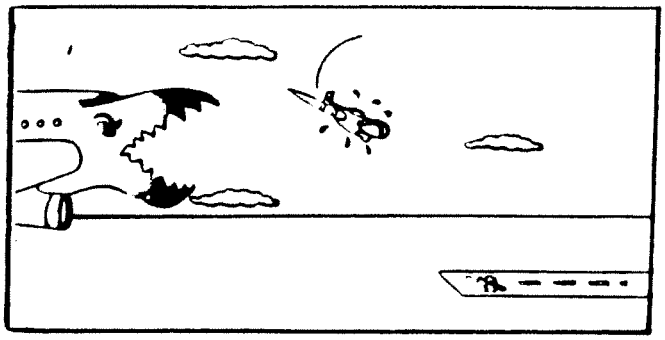
THE CROSS-CONTROL STALL

Stalls are a frequent cause of landing accidents and the deadliest of all is the cross-control stall.

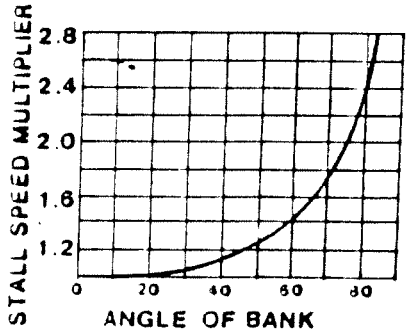
A cross-control stall is usually set up on base and the potential for it becomes greater in the presence of a tailwind on that leg. A tailwind creates greater groundspeed which gives you less time to react.



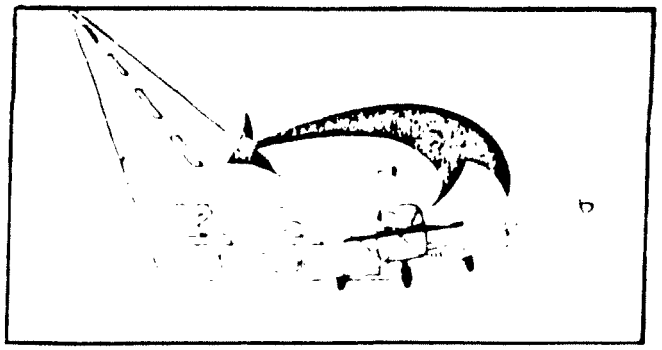
Add a distraction such as conflicting traffic or a problem in the cockpit and you're ripe for a late turn onto final and the potential for a cross-control stall.



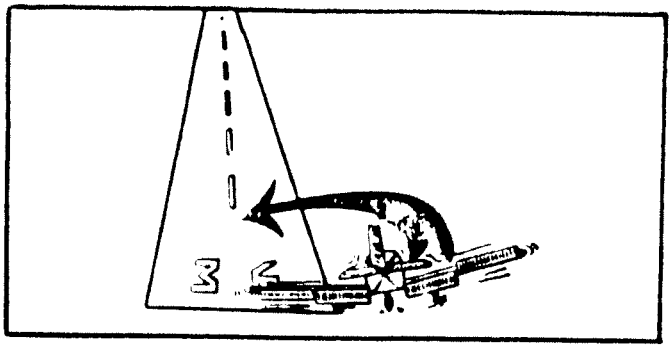
Making that turn to final, you don't want to make a steep banked turn because you know that the stall speed increases with bank angle.



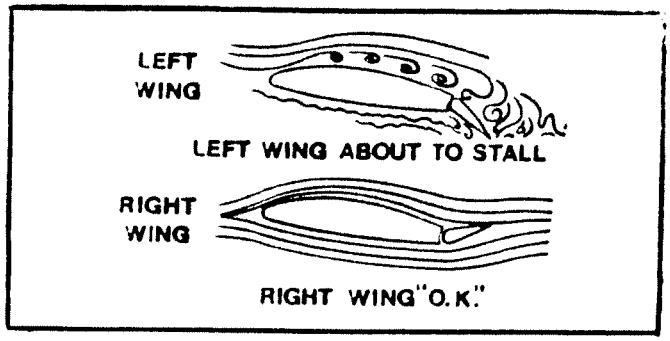
Instead, you try to increase the rate-of-turn with rudder alone, all the while keeping your bank shallow with opposite aileron.

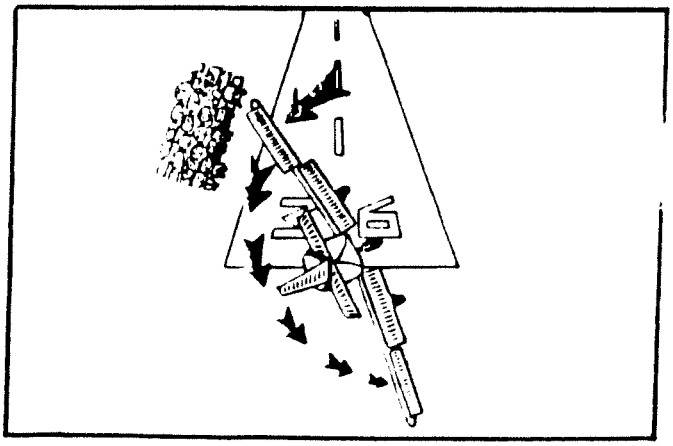


Of course, now you'll need more "up" elevator because the combination of inside rudder and "down" aileron drag makes the nose drop.



As you pull back, you slow down and, bang, there's a stall and a snap roll toward the lower, inside, wing.





This situation can be avoided by good planning, including a properly flown pattern, proper airspeeds, and a timely go-around when things don't feel right.

Some other points:

—Complete as much of your "before landing" checklist as possible before entering the pattern.

—Look outside the cockpit for helpful indications of wind—flags, smoke, and ponds, for example.

—Listen to the radio for UNICOM and ATIS advisories on landing conditions.

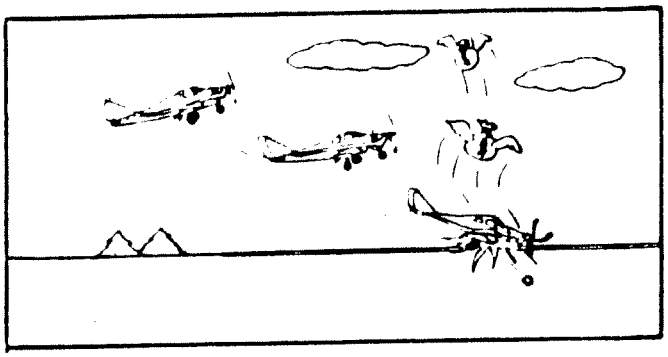
—When you have the option, handle a direct crosswind situation by flying a pattern that gives you a headwind, not a tailwind, on base.

...ED LANDINGS & LOSS OF DIRECTIONAL CONTROL

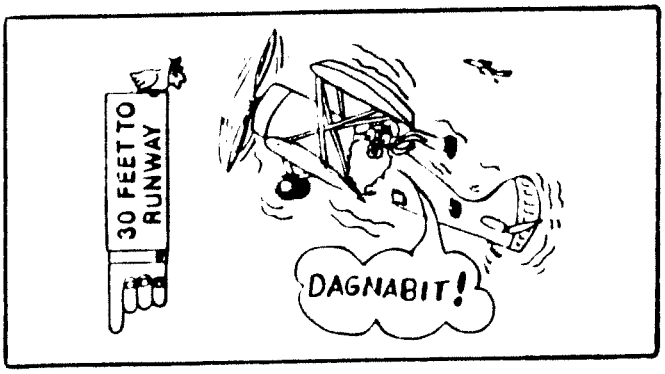
Let's now look at three other types of landing phase accidents: the hard landing, the bounced landing, and loss of directional control on roll-out. These are not killer mishaps like the cross-control stall and the undershoot, but they, too, result in substantial damage, injuries and embarrassment.

Hard Landings

Drop-in or "hard" landings cause a great deal of monetary damage to airplanes each year. These accidents result from several causes:



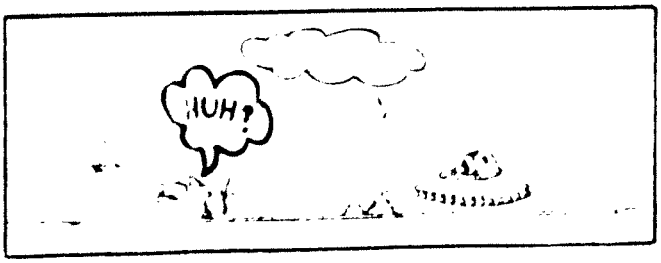
You can set yourself up for a hard landing by not looking out ahead of the airplane and losing your perspective relative to the ground.



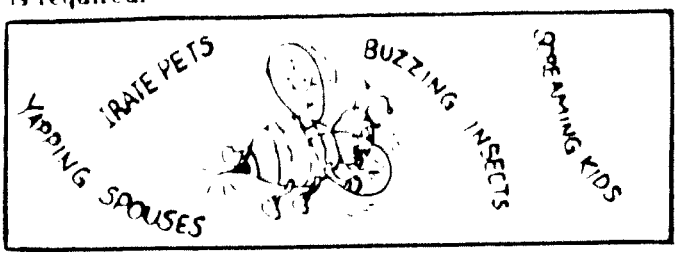
Loss of perspective can also be the result of improper scanning during flare and touchdown.

Remember to look outside the cockpit—way outside. And don't forget to use your peripheral vision as well. It's something you learned way back in pre-solo: to focus your attention *ahead* of the airplane.

Hard landings are also the result of distractions.

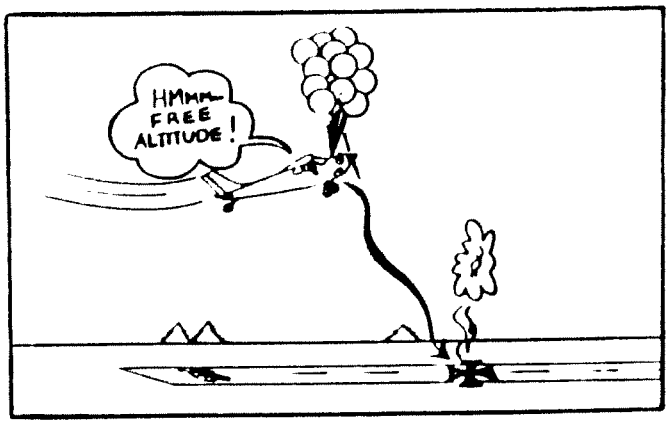


A typical distraction is a disturbance with passengers in the cabin. Don't be distracted! The landing is the last part of the flight, the part where you're the most tired, yet it's the point where the most concentration is required.



To alleviate distractions, airlines have adopted the "sterile cockpit" concept. Below a certain altitude, all conversation is limited only to matters concerning aircraft operations. It's a rule you may want to adopt.

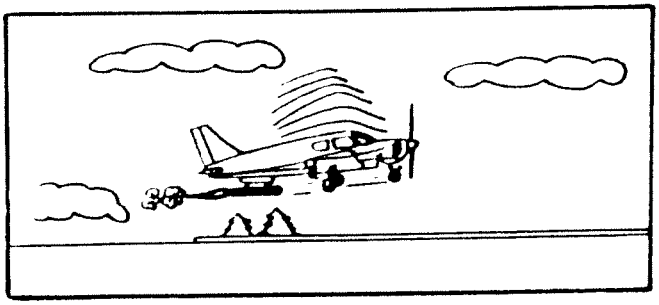
Ballooning is another cause of hard landings.



This often results from excess airspeed combined with poor flare technique. (Yanking back on the controls before touchdown can put you several stories above the runway with airspeed decaying rapidly.)

If this happens, *ease* the nose over gently and add power if necessary.

Remember, too, a full power go-around may be your best bet to avoid a hard landing after ballooning.



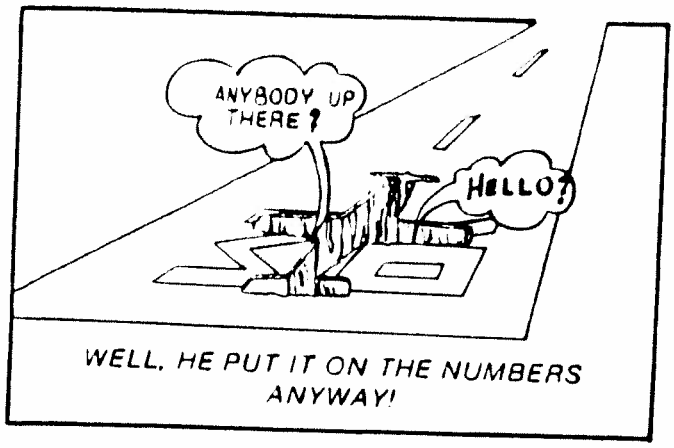
Another cause of hard landings, as discussed earlier, is trying to stretch a final approach by raising the nose without adding power. Also beware of running out of elevator control during flare. A typical example happens when you're too slow with too much weight up front. You may not have the flare power you need. A high descent rate makes these conditions even more serious. Be sure you're OK on CG.

In summary, if you think you're headed for a hard landing:

—Add power to arrest the sink rate;

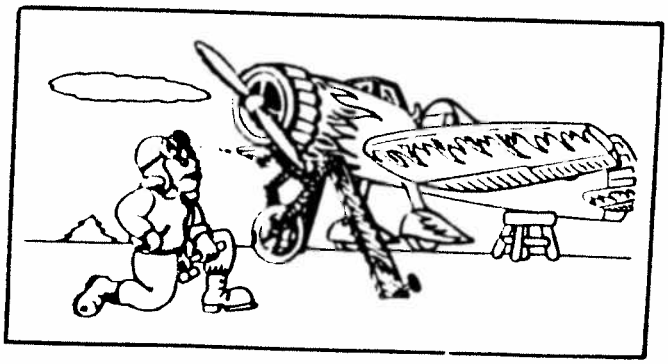
—Keep your wings level;

—If you decide to make a go-around, make the decision sooner rather than later.

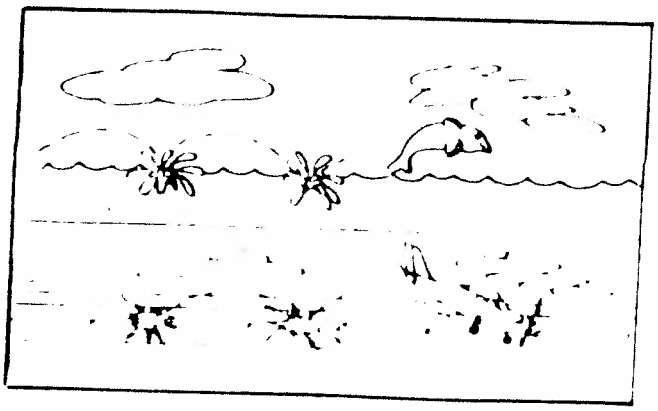


The Bounced Landing

The bounced landing, or pilot-induced oscillation (porpoising), was supposed to be cured by the introduction of tricycle landing gear. Not so. Innovative pilots keep discovering new ways to make bad landings.

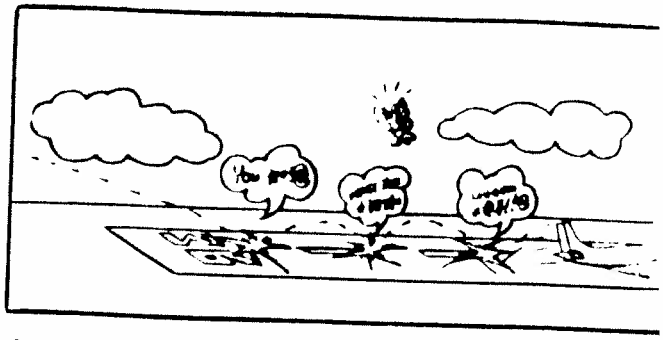


In a bounced landing, the airplane comes in nosewheel first (or for a tail-dragger, main gear first)—setting off a series of motions that imitate the jumps and dives of a porpoise—hence the name.

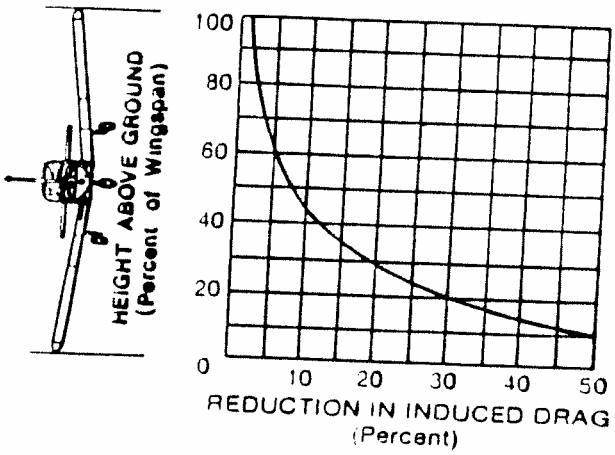


The problem is improper aircraft attitude at touchdown, sometimes caused by inattention, by not knowing where the ground is, by mistrimming, or by trying to force the aircraft onto the runway.

No matter what the cause, the situation must be corrected immediately.

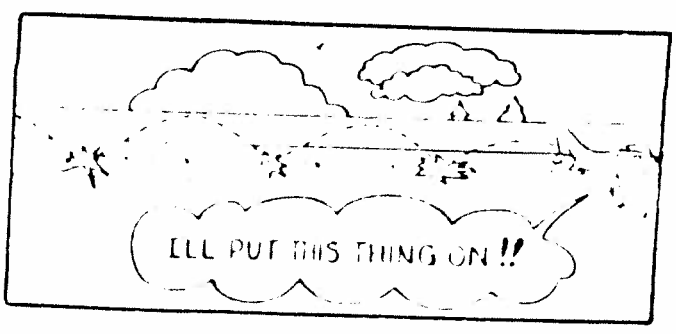


Ground effect, a factor from the surface to a height of about half the plane's wing span, decreases elevator control effectiveness and increases the effort required to raise the nose and hold the airplane off. Not enough elevator (or stabilator) trim can result in a nose-low contact with the runway and a porpoise.

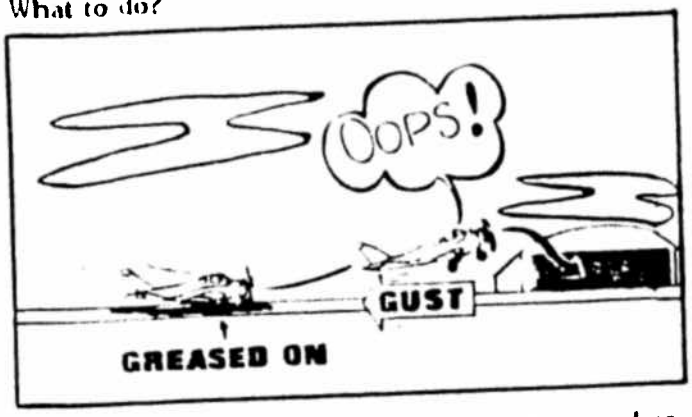


The secret to a good landing is proper aircraft attitude at touchdown. For tricycle gear planes, it's the attitude that assures that the main wheels will touch *before* the nose wheel. You'll need to develop a feel for this attitude in your particular aircraft and stay proficient at it. You'll also need to know what it "feels like" at all combinations of weight and CG.

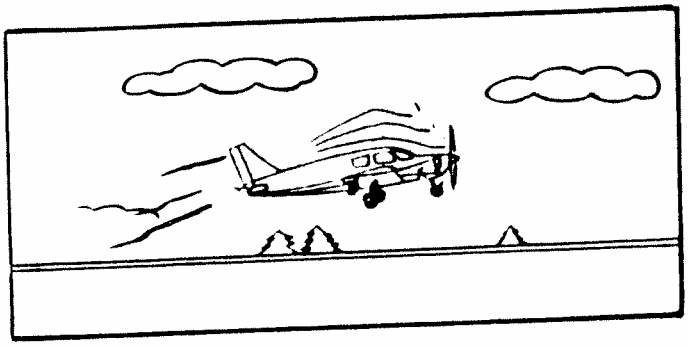
Porpoising can also be caused by improper airspeed control. Usually, if an approach is too fast, the airplane floats and the pilot tries to force it on the runway when the airplane still wants to fly.



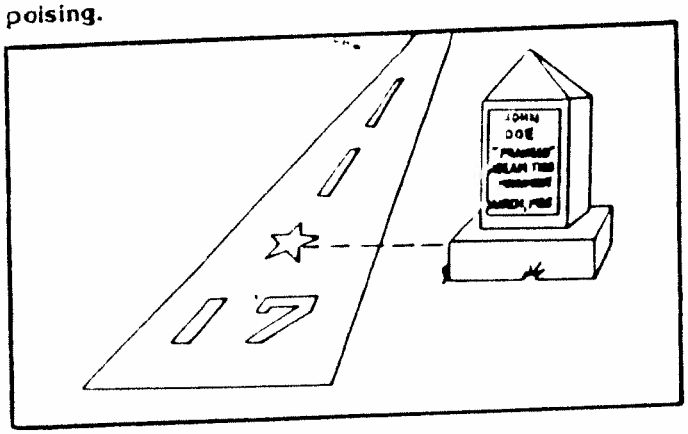
A gust of wind, a bump in the runway, even a slight tug on the wheel will send the aircraft aloft again. What to do?



First, *don't push* the nose over. *Ease* it over and re-land, this time holding the proper pitch attitude until the aircraft touches down. Add back pressure continually as the aircraft slows during the flare.



Too many airplanes have been pranged because of the pilot's desire to put the airplane on the ground. A go-around may be the answer in some cases of porpoising.



To avoid porpoising:

—Always trim the airplane for a stabilized approach;

—Avoid excess airspeed and "floating";

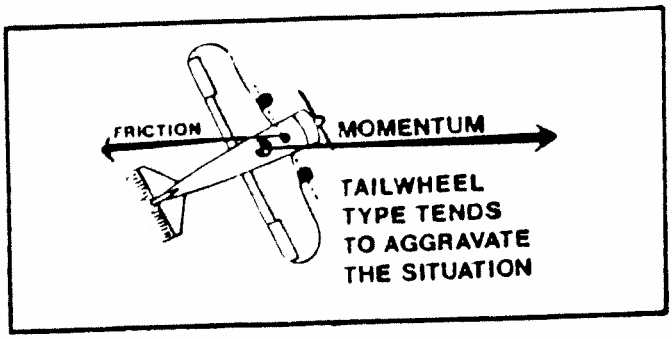
—Don't be distracted;

—Maintain proper pitch attitude; and

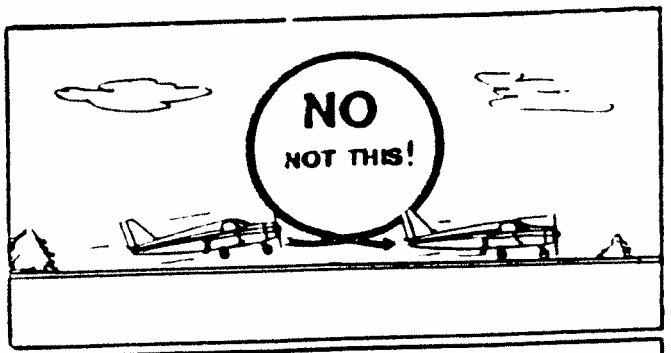
—Stay proficient.

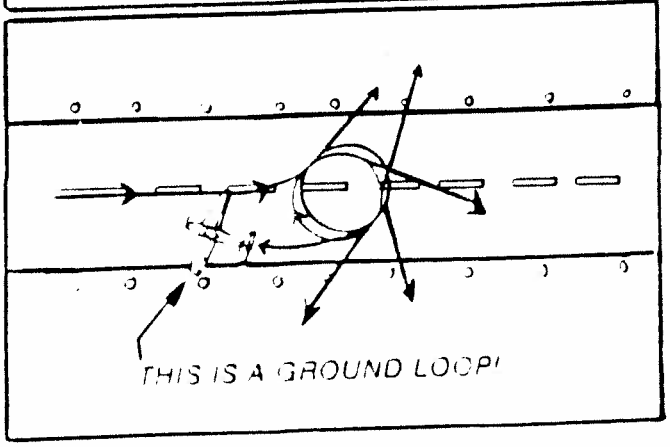
Loss of Directional Control

Engineers also thought tricycle landing gear would eliminate directional control problems and ground looping. Not so.

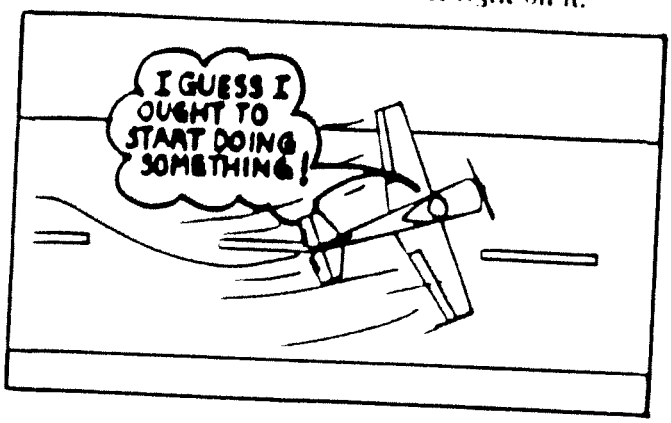


(For those who aren't familiar with this nemesis, a ground loop is an uncontrolled turn—often violent—usually on landing and roll-out.)

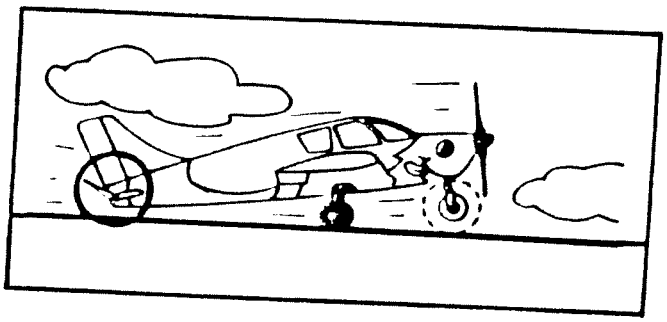




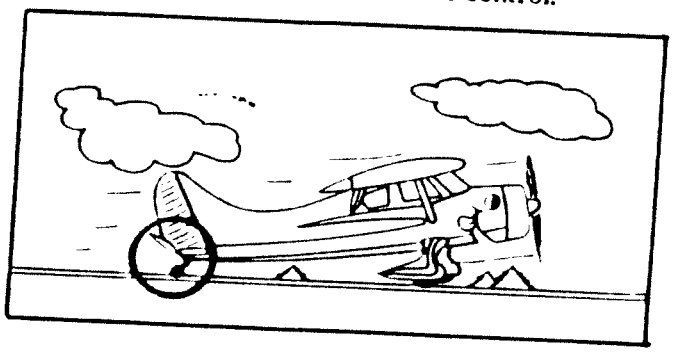
How to avoid loss of directional control? Recognize and correct problems early. Stop any incipient turn or swerve almost before it starts. Get right on it.



Also, use your controls to their best advantage. Keep the weight of tricycle gear aircraft on the mains with elevator back pressure—this also desensitizes the nose-wheel.

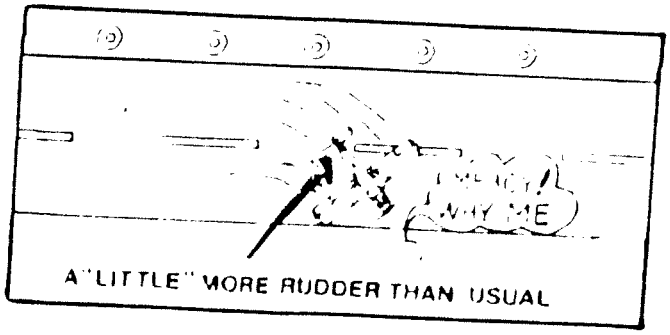


In tail-draggers, full back stick puts more weight on the tail-wheel for better directional control.



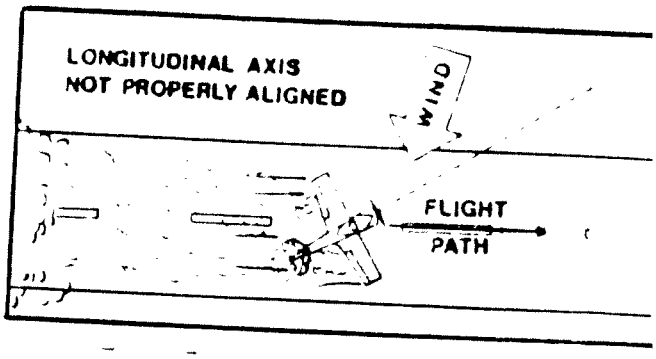
Lack of sufficient back pressure can multiply the effects of small rudder movements (or reactions to crosswinds)—overcorrections that can induce trouble.

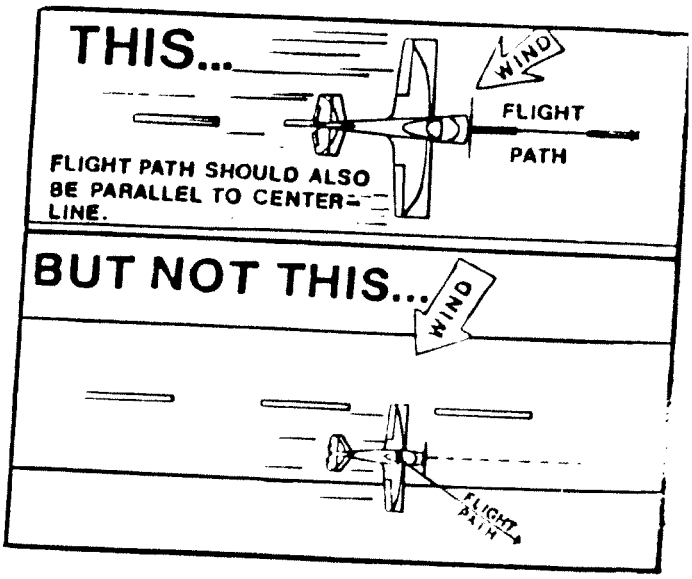
If you get in trouble, close the throttle, apply back pressure and regain control.



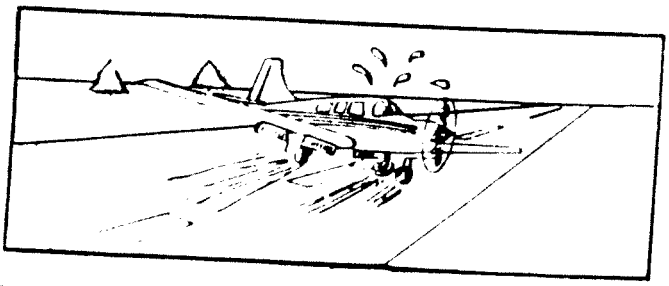
Crosswinds can be a real problem.

Remember, in a crosswind landing, the longitudin axis of the airplane must remain parallel to the ru way centerline as must the flight path of the airplan





If you don't do both, strong side loads may be exerte on the landing gear, and a ground loop could occu (resulting in even higher side loads).

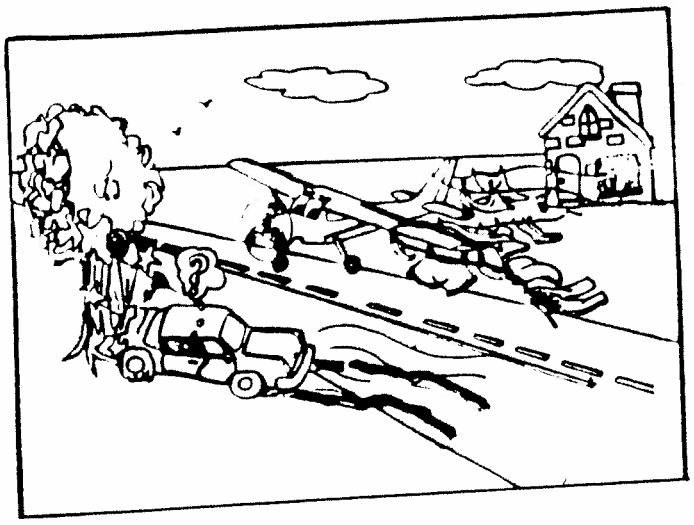


Proper crosswind technique is a must. In the case of a left crosswind, the left wing must be lowered into the wind and this control input countered with right rudder to maintain the proper track down to the runway. Again, the longitudinal axis of the airplane must be aligned with the flight path which, hopefully, is parallel to the runway centerline.

By the way, you should know the crosswind limitations of your airplane *and* yourself. In some cases, it is best to stay on the ground, or, if airborne, to locate another runway more aligned with the wind.

One of the worst ego bruises occurs when the pilot tries to clear the runway before he or she has slowed down enough. This is even more of a problem in some crosswind conditions.

Simply following the yellow exit line may lead to an unplanned cross-country. A much better technique is to stay on the runway centerline until you've slowed down to taxi speed.



Face it, there's only one principal cause for loss of directional control—*pilot error*. It's not only lack of knowledge of the "basics." Recent studies also point to preoccupation, stress, fatigue, or just being on a "mental holiday."

Use the sterile cockpit rule on yourself. Think ahead of the airplane on every approach. Continue to fly the airplane after touchdown. *And stay proficient.*

Worst of all, don't freeze. Remember the saying on the mayonnaise jar, "keep cool but do not freeze." Stay on top of the situation.

Panic can also result in a reversion to "driving response," or trying to steer the aircraft down the runway with the control wheel. That wheel has no purpose in steering on the ground and "driving response" can lead to loss of control.

To summarize, directional control accidents can be greatly reduced if, as pilots, we follow these simple rules:

—Maintain proficiency;

—Stay ahead of the airplane;

—Avoid wheelbarrowing by holding back-pressure on the controls during roll-out;

—Keep your flight path and longitudinal axis parallel to the runway centerline;

—Double check wind conditions on short final;

—Stay within the demonstrated crosswind capabilities for both you *and* the airplane;

—Slow the airplane down before taxiing clear;

—Keep your thoughts on the landing, that is, don't be distracted, and finally;

—"Keep cool but do not freeze."

Note: The suggestions and "rules" stated in this handout are intended to be helpful as they are not intended to replace or supersede the recommendations of the aircraft manufacturer.