NOVA AVIATION

Flight Operations Manual C-172

October 23, 2011

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Flight Operations Manual

Cessna 172s

NOVA

AVIATION

Procedures in this publication are derived from procedures in the FAA approved Airplane Flight Manual (AFM) released in 2007. NOVA Aviation has attempted to ensure that the data contained agrees with the data in the AFM. If there is any disagreement, ***the Airplane Flight Manual is the Final Authority.***

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How to use this Book

This book should be used as a supplement for the planning and execution of all flights in a NOVA C-172s aircraft. Although an excellent resource, this information will not guarantee a safe flight. Minimizing flight risk requires sound judgment and sensible operating practices. Safety of flight ultimately depends upon the decisions made by you, the pilot.

Safe flights should be conducted in accordance with regulations, ATC clearances, personal capabilities, and the aircraft operating limitations described in the FAA Approved Airplane Flight Manual and Pilots Operating Handbook (POH). Procedures in this publication are derived from procedures in the FAA Approved Airplane Flight Manual (AFM). NOVA has attempted to ensure that the data contained here agrees with the data in the AFM. If there is any disagreement, **the Airplane Fight Manual is the final authority.** For operations outside the United States, refer to the appropriate regulations for that country. This publication should be in the pilot's possession during all flight operations.

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Section 1

Introduction

Section 1 – Introduction

General

Procedures in this publication are derived from procedures in the FAA Approved Airplane Flight Manual (AFM). NOVA Aviation has attempted to ensure that the data contained agrees with the data in the AFM. If there is any disagreement, ***the Airplane Flight Manual is the final authority.***

Single Pilot Resource Management

Single pilot resource management (SRM) is the art and science of managing all the resources available to a single-pilot to ensure that the successful outcome of the flight is never in doubt.

The majority of Cessna aircraft operations are conducted single-pilot. The work load associated with flying the aircraft, configuring and monitoring avionics, communicating with air traffic control, and decision making can be overwhelming at times. The following SRM procedures have been adapted from cockpit procedures common to dual pilot transport category aircraft.

General aviation pilots have a great deal of latitude on how to manage and operate aircraft. To ensure the highest levels of safety it is strongly recommended that these single-pilot operating procedures be incorporated into the operation of the aircraft.

Priority of Tasks

The following is a list of priorities that apply to any situation encountered in flight. Pilots must adhere to these priorities during every flight.

1. Maintain Aircraft Control
   The number one priority of the pilot is to maintain aircraft control. Pilots should maintain a high level of vigilance during periods of high and low workload to ensure aircraft control is always maintained.

2. Navigation
   Once aircraft control is assured, pilots should set and verify the avionics are correctly configured for navigation. This task includes programming GPS units and the PFD. Use of the autopilot may assist with accomplishing these tasks. Pilots should closely monitor flight parameters while programming various avionics equipment.

3. Communication
   Communication is an important task in the aircraft but follows aircraft control and navigation as a priority. Communicate intentions and relay instructions clearly to ATC/CTAF while maintaining aircraft control.

·Note·

Using Standard Operating Procedures will aid the pilot in timely completion of required tasks and allow the pilot to maintain high levels of situational awareness.

Checklist Philosophy

When used properly, checklists enhance safety of flight by confirming the aircraft is appropriately configured for the flight condition. At the same time, checklists expedite the completion of procedures that are necessary to transition to subsequent phases of flight.

The electronic checklist in the MFD should be used anytime the MFD is running. Use of electronic checklists will help keep the cockpit organized and functional. Use a paper checklist whenever the MFD electronic checklists are not available.

Classification of Checklists

All checklist procedures can be assigned one of three classifications:

Normal: Procedures used during normal operations. Normal checklists can be found in the Normal Procedures section of the POH.

Abnormal: Procedures used in response to system malfunctions that, while not immediately threatening, may affect safety of flight if not addressed. Abnormal checklists can be found in the Abnormal Procedures section of the POH.

Emergency: Procedures used in response to system failures and malfunctions that are an immediate threat to safety of flight. Emergencies require immediate action by the flight crew to ensure a safe outcome. Emergency checklists can be found in the Emergency Procedures section of the POH.

Reference Materials

The following references supplement the content of this publication:

- Federal Aviation Regulations (FARs) or governing regulations, as applicable
- Aeronautical Information Manual (AIM)
- FAA Approved Airplane Flight Manual and Pilot's Operating Handbook
- Advisory Circulars
- Avionics Pilot Guides and Manuals

Terms and Abbreviations

The following terms and abbreviations will be referenced in this manual.

AP	Autopilot
ATC	Air Traffic Control
DA	Decision Altitude
ETA	Estimated Time of Arrival
ETE	Estimated Time En-route
FAA	Federal Aviation Administration
FAF	Final Approach Fix
FITS	FAA Industry Training Standards
GNS	Global Navigation System
GPS	Global Positioning System
GS	Glide Slope
IAF	Initial Approach Fix
IAP	Instrument Approach Procedures
LNAV	Lateral Navigation
LPV	Localizer Performance with Vertical Guidance
MAP	Missed Approach Point
MDA	Minimum Descent Altitude
MFD	Multi Function Display
NAS	National Airspace System
PFD	Primary Flight Display
PIC	Pilot-In-Command
SRM	Single-Pilot Resource Management
VNAV	Vertical Navigation
VTF	Vectors-To-Final
WAAS	Wide Area Augmentation System

Contact Information

NOVA Flight Desk……877-FLY-NOVA (877-359-6682)

After Hours:

Angel Cortes……...973-769-0557

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Section 2

Limitations

Section 2 – Limitations

General

The Limitations Section of the Pilot's Operating Handbook (POH) is the official document approved by the Federal Aviation Administration. It provides operating limitations, instrument markings, basic placards required by regulation, and standard systems and equipment required for safe operation. For amended operating limitations for airplanes equipped with optional equipment, refer to Section 9 – Supplements of the Pilot's Operating Handbook.

Compliance with the operating limitations in the Pilot's Operating Handbook is required by Federal Aviation Regulations.

C-172s V-Speeds			
Abbreviation	Definition	Value (KIAS)	Color
Vne	Never Exceed Speed	163 Kts	Red Radial Line
Vno	Maximum Structural Cruising Speed	129 Kts	Top of Green Arc
Va	Maneuvering Speed		Not Colored
	Va @ 2550 lbs	105 Kts	
	Va @ 2200 lbs	98 Kts	
	Va @ 1900 lbs	90 Kts	
Vfe	Maximum Flap Extension Speed		
	Flaps 10^0	110 Kts	Not Colored
	Flaps 10^0 to Full	85 Kts	Top of White Arc
Vso	Stall speed landing configuration	40 Kts	Bottom of White Arc
Vs	Stall speed flaps retracted	48 Kts	Bottom of Green Arc
Vglide	Best glide speed engine out	68 Kts	Not Colored
Vx	Best Angle of Climb	62 Kts	Not Colored
Vy	Best Rate of Climb	74 Kts	Not Colored
	Normal Approach to Landing	65 Kts	Not Colored
	Shortfield Approach to Landing	61 Kts	Not Colored
	Max Demonstrated Cross Wind	15 Kts	Not Colored

Note: Unless otherwise noted, the following speeds are based on a maximum weights of 2550 pounds and may be used for any lesser weight.

C-172s Performance Specifications	
Speed	Knots
Maximum at Sea Level	126 Kts
Cruise, 75% Power at 8,500 feet	124 Kts
Cruise	
Cruise: Recommended lean mixture with fuel allowance for engine start, taxi, takeoff, climb and 45 minutes reserve.	
75% Power at 8,500 feet	Range - 518 NM
53 Gallons Useable Fuel	Time - 4.26 Hours
Range, 45% Power at 10,000 feet	Range - 638 NM
53 Gallons Useable Fuel	Time - 6.72 Hours
Rate of Climb	Feet Per Minute
Rate of Climb at Sea Level	730 FPM
Service Ceiling	Feet
Service Ceiling	14,000 Feet
Take Off Performance	Feet
Ground Roll	960 Feet
Total Distace Over 50 foot Obstacle	1630 Feet
Maximum Weight	Pounds
Ramp	2558 lbs
Take Off	2550 lbs
Landing	2550 lbs
Other Performance Data	
Standard Empty Weight	1663 lbs
Maximum Useful Load	895 lbs
Baggage Allowance	120 lbs
Wing Loading	14.7 lbs/sq. ft.
Power Loading	14.2 lbs/HP
Fuel Capacity	56 Gallons
Oil Capacity	8 quarts
Engine: Textron Lycoming, 180 BHP @ 2700 RPM	Model: IO-360-L2A
Propeller: Fixed Pitch	76 inches Diameter

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Section 3

Standing Operating Procedures

Flight Operations Manual C-172

Section 3 – Standard Operating Procedures

General

The Standard Operating Procedures section describes the recommended procedures when operating a NOVA Cessna 172s NAV III during visual an instrument conditions. This information should serve as a framework for aircraft and avionics management. The procedures outlined are considered the best operating practices while flying a NOVA Cessna 172s NAV III; however, these procedures may not be inclusive to all variables encountered in the national airspace system. NOVA pilots are encouraged to follow the procedures outlined in the manual and use their best judgment when handling non standard situations.

Utilizing these standard operating procedures will enhance the situational awareness of the pilot in both single pilot and crew situations and allow for timely completion of tasks in the aircraft. Adhering to these procedures will help the pilot take full advantage of the aircraft's capabilities while maintaining a high level of safety.

·Note·

Procedures in this publication are derived from procedures in the FAA Approved Airplane Flight Manual (AFM). NOVA has attempted to ensure that the data contained agrees with the data in the AFM. If there is any disagreement, ***the Airplane Flight Manual is the final authority.***

Checklist Completion for Normal Procedures

Normal procedure checklists can be completed as a flow pattern or a do-list. The appropriate method for checklist completion for each normal procedure is indicated in the procedures section for each phase of flight.

Do-List: A do-list checklist is executed by reading the checklist item and selecting the appropriate condition of the item. Do-lists are used when procedure sequence and/or item condition is critical to completion of the procedure and when ample time exists for completion of the checklist.

Flow Pattern: The term “flow pattern” refers to a logical path through the cockpit that the pilot will move along during the execution of the checklist. Flow patterns provide us with a “do and verify” approach to checklist completion. The items and their conditions are memorized and executed without immediate reference to the written checklist. Following completion of the flow pattern, the checklist is referenced as soon as time and workload permit to ensure procedure completion.

When used properly, flow patterns allow timely configuration of the aircraft for the appropriate flight condition. Flow patterns are used when procedure sequence and aircraft condition is not critical and there is an operational advantage to executing the checklist items in a timely manner.

Preflight

The preflight inspection should be completed as a flow pattern when the pilot is familiar with the aircraft preflight inspection checklist. Always refer to the aircraft checklist after the flow to verify all items have been completed.

Documentation

The following documents must be in the aircraft for the flight:

- **A**irworthiness Certificate
- **R**egistration
- **R**adio station license for international operations only
- **O**perating Handbook
- **W**eight and Balance

·Note·

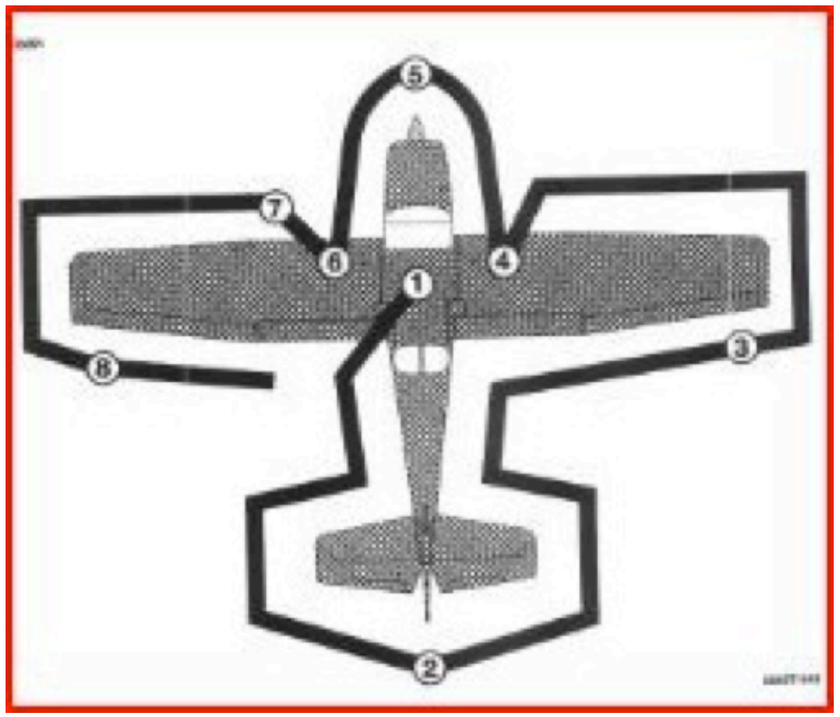
Ensure that you have all current publications for avionics and other systems accessible in flight for reference.

Equipment

The following equipment should be carried in the aircraft when appropriate:

- Survival kit (appropriate to the climate and conditions)
- Approved flotation devices for flights outside glide distance to land
- Supplemental oxygen system for high altitude operations
- Chocks, tie downs, extra oil, tow bar, engine and airplane covers

Procedure (Flow Pattern)



(Figure 3-1)

·Note·

Visually check airplane for general condition during walk-around inspection. Airplane should be parked in a normal ground attitude to make sure that fuel drain valves allow for accurate sampling. Use of the refueling steps and assist handles will simplify access to upper wing surfaces for visual checks and refueling operations. In cold weather, remove even small accumulations of frost, ice or snow from wing, tail and control surfaces. Also, make sure that control surfaces contain no internal accumulations of ice or debris. Prior to flight, check that pitot heater is warm to the touch within 30 seconds with battery and pitot heat switches on. If a night flight is planned, check operation of all lights, and make sure a flashlight is available.

1. Cabin

a. Pitot Tube Cover – Removed (check for pitot blockage)

b. Pilot's Operating Handbook – Accessible to Pilot

c. Garmin G1000 cockpit reference guide – Accessible to pilot

d. Airplane Weight and Balance – Checked

e. Parking Brake – Set

f. Control Wheel Lock – Removed

·Warning·

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

g. Magnetos Switch – Off

h. Avionics Switch (BUS 1 and BUS 2) – Off

i. Master Switch (ALT and BAT) – On

j. Primary Flight Display (PFD) – Check (Verify PFD is On)

k. Fuel Quantity (L and R) – Check

l. Low Fuel L and Low Fuel R Annunciators – Check (Verify annunciations are not shown on PFD)

m. Oil Pressure Annunciator – Check (Verify annunciator is shown)

n. Low Vacuum Annunciator – Check (Verify annunciator is shown)

o. Avionics Switch (BUS 1) – On

p. Forward Avionics Fan – Check (verify fan is heard)

q. Avionics Switch (BUS 1) – Off

r. Avionics Switch (BUS 2) – On

s. Aft Avionics Fan – Check (verify fan is heard)

t. Avionics Switch (BUS 2) – Off

u. Pitot Heat Switch – On (carefully check that pitot tube is warm to the touch within 30 seconds)

v. Pitot Heat Switch – Off

w. Low Volts Annunciator – Check (verify annunciator is shown)

x. Flaps - Extend

y. Master Switch (ALT and BAT) – Off

z. Elevator Trim Control – Takeoff Position

aa. Fuel Selector Valve – Both

bb. Alternate Static Air Valve – Off (push full in)

cc. Fire Extinguisher – Check (Verify gage pointer in green arc)

2. Empennage

a. Baggage Compartment Door – Check (Lock with Key)

b. Rudder Gust Lock (if installed) – Remove

c. Tail Tiedown – Disconnect

d. Control Surfaces – Check (freedom of movement and security)

e. Elevator Trim Tab – Check (security)

f. Antennas – Check (security of attachment and general condition)

3. Right Wing Trailing Edge

a. Flap – Check (security and condition)

b. Aileron – Check (freedom of movement and security)

4. Right Wing

a. Wing Tiedown – Disconnect

b. Main Wheel Tire – Check (proper inflation and general condition (weather checks, tread depth and wear, etc.))

c. Fuel Tank Sump Quick Drain Valves – Drain

Drain at least a capful of fuel (using sampler cup) from each sump location to check water, sediment, and roper fuel grade before each flight and after each refueling. If water is observed, take further samples until clear and then gently rock wings and lower tail to the ground to move any additional contaminants to the sampling points. Take repeated samples from all fuel drain points until all contamination has been removed. If contaminants are still present, refer to warning below and do not fly the plane.

·Note·

Collect all sampled fuel in a safe container. Dispose of sampled fuel so that it does not cause a nuisance, hazard or damage to the environment.

·WARNING·

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

d. Fuel Quantity – Check Visually (for desired level)

e. Fuel Filler Cap – Secure and Vent Clear

5. Nose

a. Fuel Strainer Quick Drain Valve (located on bottom of fuselage) – Drain

Drain at least a cupful of fuel (using sampler cup) from valve to check for water, sediment and proper fuel grade before each flight and after refueling. If water is observed, take further samples until clear and then gently rock wings and lower tail to the ground to move any additional contaminants to the sampling points. Take repeated samples from all fuel drain points, including the fuel reservoir and fuel selector, until all contamination has been removed. If contaminates are still present, refer to warning below and do not fly the airplane.

·Note·

Collect all sampled fuel in a safe container. Dispose of sampled fuel so that it does not cause a nuisance, hazard or damage to the environment.

·WARNING·

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

b. Engine Oil Dipstick / Filler Cap

1. Oil Level – Check
2. Dipstick / Filler Cap – Secure

Do not operate with less than 5 quarts. Fill to 8 quarts for extended flight.

c. Engine Cooling Air Inlets – Check (clear of obstructions)

d. Propeller and Spinner – Check (for nicks and security)

e. Air Filter – Check (for restrictions by dust or other foreign matter)

f. Nose Wheel Strut and Tire – Check (proper inflation of strut and general condition of tire (weather checks, tread depth and wear, etc.))

g. Static Source Opening (left side of fuselage) – Check (verify opening is clear)

6. Left Wing Leading Edge

a. Fuel Tank Vent Opening – Check (blockage)

b. Stall Warning Opening – Check (Blockage)

·Note·

To check the system, place a clean handkerchief over the vent opening and apply suction; a sound from the warning horn will confirm system operation.

c. Landing/Taxi Lights – Check (condition and cleanliness of cover)

7. Left Wing

a. Wing Tiedown – Disconnect

b. Fuel Quantity – Check Visually (for desired level)

c. Fuel Filler Cap – Secure and Vent Clear

d. Fuel Tank Sump Quick Drain Valves – Drain

·Note·

Drain at least a capful of fuel (using sampler cup) from each sump location to check water, sediment, and roper fuel grade before each flight and after each refueling. If water is observed, take further samples until clear and then gently rock wings and lower tail to the ground to move any additional contaminants to the sampling points. Take repeated samples from all fuel drain points until all contamination has been removed. If contaminants are still present, refer to warning below and do not fly the plane.

IMPORTANT: Collect all sampled fuel in a safe container. Dispose of sampled fuel so that it does not cause a nuisance, hazard or damage to the environment.

·WARNING·

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

e. Main Wheel Tire – Check (proper inflation and general condition (weather checks, tread depth and wear, etc.))

8. Left Wing Trailing Edge

a. Aileron – Check (freedom of movement and security)

b. Flap – Check (security and condition)

Before Starting Engine

Complete the before starting engine checklist as a Do-List to start the aircraft engine. Before starting the engine verify all preflight items are complete and emergency equipment s on board and stored in the proper location. Ensure seats are locked into position by verifying the control handle is in the full down position.

During engine start, the aircraft should be positioned so that the propeller blast is not directed toward any aircraft, hangar or person.

Passenger Flight Briefing

The pilot should provide a safety briefing, referencing the passenger briefing card, to all occupants prior to each flight. The pilot should also discuss sterile cabin procedures and other information as necessary. At a minimum, passengers should be briefed on the following items:

- Smoking
- Seatbelts
- Doors
- Emergency Exits
- Use of Oxygen
- Emergency equipment

Before Starting Engine (Do-List)

a. Preflight Inspection – Complete
b. Passenger Briefing – Complete
c. Seats and Seat Belts – Adjust and Lock (verify inertia locking reel)
d. Brakes – Test and Set
e. Circuit Breakers – Check In
f. Electrical Equipment – Off
g. Avionics Switch (BUS 1 and BUS 2) – Off

·Caution·

The avionics switch (BUS 1 and BUS 2) must be off during engine start to prevent possible damage to avionics.

h. Fuel Selector Valve – Both
i. Fuel Shutoff Valve – On (push full in)

Engine Start

The engine start checklist should be accomplished as a Do-list. Select the proper engine start procedure based on outside air temperature and internal engine temperature.

If engine has been exposed to temperatures at or below 20^0F (7^0C) for a period of two hours or more, the use of an external pre-heater and external power is recommended. Failure to properly pre-heat a cold soaked engine may result in congealing within the engine and oil hoses with subsequent loss of oil flow, possibly internal damage to the engine and subsequent engine failure.

If the engine does not start during the first few attempts, or if the engine firing diminishes in strength, the spark plugs have probably frosted over. Pre-heat must be used before another start is attempted.

Starting Engine (With Battery) (Do-List)

a. Throttle Control – Open ¼ inch

b. Mixture Control – Idle Cutoff (pull full out)

c. Standby Battery Switch:

1. Test – (hold for 20 seconds, verify that green test lamp does not go out)

2. Arm – (verify that PFD comes on)

d. Engine Indicating System – Check Parameters (verify no red X's through engine page indicator's)

e. BUS E Volts – Check (verify 24 volts minimum show)

f. M BUS Volts – Check (verify 1.5 volts or less shown)

g. BATT S Amps – Check (verify annunciator is shown)

h. Standby Battery Annunciator – Check (verify annunciator is shown)

i. Propeller Area – Clear (verify that all people and equipment are at a safe distance from the propeller)

j. Master Switch (ALT and BAT) – On

k. Beacon Light Switch – On

·Note·

If engine is warm, omit priming procedure steps l thru n below.

l. Fuel Pump Switch – On

m. Mixture Control – Set to Full Rich (full forward) until stable fuel flow is indicated (approximately 3-5 seconds), then set to Idle Cutoff (full aft) position.

n. Fuel Pump Switch – Off

o. Magnetos Switch – Start (release when engine starts)

p. Mixture Control – Advance Smoothly to Rich (when engine starts)

·Note·

If the engine is primed too much (flooded), place the mixture control to idle cutoff position, open the throttle control ½ to full, and engage the starter motor (start). When the engine starts, advance the mixture control to full rich position and retard the throttle control promptly.

q. Oil Pressure – Check (verify that oil pressure increases into the green band range in 30-60 seconds)

r. AMPS (M BATT and BATT S) – Check (verify charge shown (positive))

s. Low Volts Annunciation – Check (verify annunciation is not shown)

t. NAV Light Switch – On as required

u. Avionics Switch (BUS 1 and BUS 2) – On

v. Flaps - Retract

Starting Engine (With External Power) (Do-List)

a. Throttle Control – Open ¼ inch

b. Mixture Control – Idle Cutoff (pull full out)

c. Standby Battery Switch:

1. Test – (hold for 20 seconds, verify that green test lamp does not go out)

2. Arm – (verify that PFD comes on)

d. Engine Indicating System – Check Parameters (verify no red X's through engine page indicator's)

e. BUS E Volts – Check (verify 24 volts minimum show)

f. M BUS Volts – Check (verify 1.5 volts or less shown)

g. BATT S Amps – Check (verify annunciator is shown)

h. Standby Battery Annunciator – Check (verify annunciator is shown)

i. Avionics Switch (BUS 1 and BUS 2) – Off

j. Master Switch (ALT and BAT) – Off

k. Propeller Area – Clear (verify that all people and equipment are at a safe

distance from the propeller)

l. External Power – Connect (to ground power receptacle)

m. Master Switch (ALT and BAT) – On

n. Beacon Light Switch – On

o. M BUS Volts – Check (verify that approximately 28 volts is shown)

·Note·

If engine is warm, omit priming procedure steps p. thru r. below.

p. Fuel Pump Switch – On

q. Mixture Control – Set to Full Rich (full forward) until stable fuel flow is indicated (approximately 3-5 seconds), then set to Idle Cutoff (full aft) position.

r. Fuel Pump Switch – Off

s. Magnetos Switch – Start (release when engine starts)

t. Mixture Control – Advance Smoothly to Rich (when engine starts)

·Note·

If the engine is primed to much (flooded), place the mixture control to idle cutoff position, open the throttle control ½ to full, and engage the starter motor (start). When the engine starts, advance the mixture control to full rich position and retard the throttle control promptly.

u. Oil Pressure – Check (verify that oil pressure increases into the green band range in 30-60 seconds)

v. Power – Reduce to Idle

w. External Power – Disconnect from ground power (latch external power receptacle door)

x. Power – Increase (to approximately 1500 RPM for several minutes to charge battery)

y. AMPS (M BATT and BATT S) – Check (verify charge shown (positive))

z. Low Volts Annunciator – Check (verify annunciator is not shown)

aa. Internal Power – Check

1. Master Switch (ALT) – Off

2. Taxi and Land Light Switches – On

3. Throttle Control – Reduce to Idle

4. Master Switch (ALT and BATT) – On

5. Throttle Control – Increase (to approximately 1500 RPM)

6. M BATT Ammeter – Check (verify battery charging, amps positive)

7. Low Volts Annunciator – Check (verify annunciator is not shown)

·Warning·

If M BATT ammeter does not show positive charge (+amps), or low volts annunciator does not go off, remove the battery from the airplane and service or replace the battery before flight.

bb. NAV Light Switch – On as required

cc. Avionics Switch (BUS 1 and BUS 2) – On

dd. Flaps – Retract

Before Taxi

It is recommended to set up the required navigation equipment and communication frequencies for the intended flight at this time. Set primary airborne frequencies in COM 1 (ie. Tower, approach, departure, or center) and necessary ground frequencies in COM 2 (ie. Ground, clearance, ATIS, FSS, or the FBO). Always lean mixture as outlined below during all ground operations. This helps to prevent the spark plugs from fouling.

Ground Leaning Procedure

a. Set throttle to 1200 RPM.

b. Lean the mixture for maximum RPM

c. Set the throttle control to an RPM appropriate for ground operations (800 to 1000 RPM recommended)

Taxi Out

A cause of brake failure is the creation of excessive heat through improper braking practices. Riding the brakes while taxiing causes a continuous build up of energy which may lead to excessive heat. Excessive heat causes warped brake rotors, damaged or glazed linings, damaged o-rings, and vaporized brake fluid. To avoid brake failure, observe the following operating and maintenance practices:

- Directional control should be maintained with nose wheel steering and rudder deflection supplemented with brake pressure as required
- Use only as much power (throttle) as is necessary to achieve forward movement. 1000 RPM is enough to maintain forward movement under normal conditions
- Avoid unnecessary high speed taxiing. High speed taxiing will result in excessive demands on the brakes, increased brake wear and the possibility of brake failure.
- Use the minimum necessary brake application to achieve directional control
- Do not ride the brakes. Pilots should consciously remove pressure from the brakes while taxiing. Failure to do so results in excessive eat, premature brake wear and increased possibility of brake failure.
- Refer to the handling, service and maintenance section of the POH or the maintenance manual for recommended maintenance and inspection intervals for brakes
- Wind deflection w/controls

Maintain high levels of situational awareness during all movements on the airport surface to avoid runway incursions or accidents. Minimize tasks such as reading checklists or folding maps while taxiing. Utilize the Safe Taxi airport diagram to aid in situational awareness.

·Warning·

Maximum continuous engine speed for taxiing is 1000 RPM on flat, smooth, hard surfaces. Power settings slightly above 1000 RPM are permissible to start motion, for turf, soft surfaces and on inclines. Use minimum power to maintain taxi speed.

Taxi-Out Procedure (Flow Pattern)

a. Taxi Clearance – Obtain (for controlled airports, uncontrolled announce intentions)

b. Parking Break – Disengage

c. Brakes – Check (upon initial movement verify both brakes are functioning by applying pressure)

d. HSI Orientation – Ensure alignment with magnetic compass

e. Attitude Gyro – Verify no Red X's

f. Turn Coordinator – Check (verify turn indicator and inclinometer are working properly, Turn indicator moves in same direction of turns, inclinometer moves opposite direction of turn)

Before Takeoff

Complete the before takeoff checklist as a Do-List. Complete the checklist prior to taking the active runway or an appropriate run up area prior to departure. The before takeoff checklist will ensure the aircraft is properly configured for takeoff. Run-up items are included in this checklist. Verify engine oil temperature reaches a minimum of 100^0 F prior to applying run up power settings. Verify all engine and electrical indications are normal prior to departure.

During cold weather operations, the engine should be properly warmed before takeoff. In most cases this is accomplished when the oil temperature has reached at least 100^0 F. In warm or hot weather, precautions should be taken to avoid overheating during prolonged ground engine operations. Additionally, long periods of idling may cause fouled spark plugs.

Before Takeoff Procedure (Do-List)

1. Parking Break – Set
2. Pilot and Passengers Seat Backs – Most Upright Position
3. Seat and Seat Belts – Check Secure
4. Cabin Doors – Closed and Locked
5. Flight Controls – Free and Correct
6. Flight Instruments (PFD) – Check (no red X's)
7. Altimeters:
   a. PFD (BARO) – Set
   b. Standby Altimeter – Set
8. ALT Select – Set
9. HDG Bug – Set
10. Standby Flight Instruments – Check
11. Fuel Quantity – Check (verify level is correct)

·Warning·

Maximum continuous engine speed for taxiing is 1000 RPM on flat, smooth, hard surfaces. Power settings slightly above 1000 RPM are permissible to start motion, for turf, soft surfaces and on inclines. Use minimum power to maintain taxi speed.

Taxi-Out Procedure (Flow Pattern)

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d. HSI Orientation – Ensure alignment with magnetic compass

e. Attitude Gyro – Verify no Red X's

f. Turn Coordinator – Check (verify turn indicator and inclinometer are working properly, Turn indicator moves in same direction of turns, inclinometer moves opposite direction of turn)

·Note·

Flight is not recommended when both fuel quantity indicators are in the yellow band range.

12. Mixture Control – Rich
13. Fuel Selector Valve – Set Both
14. Autopilot – Engage (push AP button on either PFD or MFD bezel)
15. Flight Controls – Check (verify autopilot can be overpowered in both pith and roll axes)
16. A/P Trim Disc Button – Press (verify autopilot disengages and aural alert is heard)
17. Flight Director – Off (push FD button on either PFD or MFD bezel)
18. Elevator Trim Control – Set for Takeoff

19. Throttle Control – 1800 RPM

    a. Magnetos Switch – Check (RPM drop should not exceed 150 RPM on either magneto or 50 RPM differential between magnetos)

    b. VAC Indicator – Check

    c. Engine Indicators – Check

    d. Ammeters and Voltmeters – Check

20. Annunciators – Check (verify no annunciators are shown)

21. Throttle – Check Idle

22. Throttle – 1000 RPM or less

23. Throttle Control Friction Lock – Adjust

24. COM Frequencies – Set

25. NAV Frequencies – Set

26. FMS/GPS Flight Plan – As Desired

·Note·

Check GPS availability on AUX-GPS Status page. No annunciation is provided for loss of GPS2.

27. XPDR – Set

28. CDI Softkey – Select NAV Source

·Caution·

The G1000 HSI shows a course deviation indicator for the selected GPS, NAV 1, NAV 2 navigation source. The G1000 HSI does not provide a warning flag when a valid navigation signal is not being supplied to the indicator. When a valid navigation signal is not being supplied, the course deviation bar (D-BAR) part of the indicator is not shown on the HSI compass card. The missing D-BAR is considered to be the warning flag.

·Warning·

When the autopilot is engaged in NAV, APR or BC operating modes, if the HSI navigation source is changed manually, using the CDI softkey, the change will interrupt the navigation signal to the autopilot and will cause the autopilot to revert to roll mode operation. No aural alert will be provided. In roll mode the autopilot will only keep the wings level and will not correct the airplane heading or course. Set the heading bug to the correct heading and select the correct navigation source on the HSI, using the CDI softkey, before engaging the autopilot in any other operating mode.

29. Cabin PWR 12V Switch – Off

30. Wing Flaps – Up or 10^0

31. Cabin Windows – Closed

32. Strobe Lights – On

33. Brakes – Release

Take-Off

Reference the takeoff checklist prior to departure. Complete a take-off briefing to review the critical items prior to takeoff. A takeoff briefing allows the pilot to review the takeoff procedure and determine the actions necessary in the event of abnormal/emergency conditions during the takeoff roll and initial climb. At a minimum, a takeoff briefing should include the following items:

- Type of procedure used (normal, short or soft)
- Takeoff distance required/runway distance available
- Vr and initial climb speed
- Abnormality / engine failure before Vr
- Abnormality / engine failure after Vr

Sample Takeoff Briefing

This will be a _____(normal, short, soft) takeoff from runway _____ with a takeoff distance of _____ feet and _____ feet of runway available. Rotation speed is _____ KIAS. Initial heading after takeoff is _____ degrees to an altitude of _____ feet. We'll abort the takeoff for any engine failures/abnormalities prior to rotation. If the engine fails after rotation I will _____.

Takeoff Procedure (Flow Pattern)

Normal Takeoff

a. Wing Flaps – Up or 10^0
b. Throttle Control – Full (push full in)
c. Mixture Control – Rich (above 3000 feet pressure altitude, lean for maximum RPM)
d. Elevator Control – Lift Nose Wheel at 55 KIAS
e. Climb Airspeed – 70-80 KIAS
f. Wing Flaps – Retract (at safe altitude)

Short Field Takeoff

a. Wing Flaps - 10^0
b. Brakes – Apply
c. Throttle Control – Full (push full in)
d. Mixture Control – Rich (above 3000 feet pressure altitude, lean for maximum RPM)
e. Brakes – Release
f. Elevator Control – Slightly Tail Low
g. Climb Airspeed – 56 KIAS (until all obstacles are cleared)
h. Wing Flaps – Retract (when airspeed is more than 60 KIAS)

En Route Climb

Complete the climb checklist as a flow pattern when time and workload permit. Once clear of obstacles and terrain, normal climbs are performed flaps up (0^0) and full power at speeds 5 knots higher than the best rate of climb speed. These higher speeds give the best combination of performance, visibility, and engine cooling. When desired and clear of obstacles, transition to cruise climb speed for increased engine cooling, visibility and passenger comfort.

For maximum rate of climb, use the best rate of climb speeds shown in the rate of climb chart page 5-18, figure 5-6 of section 5 of the POH. If an obstruction dictates the use of a steep climb angle, the best angle of climb speed should be used. Climbs at speeds lower than the best rate of climb speed should be of short duration to avoid engine cooling problems.

·Caution·

Use caution when engaging the autopilot at low altitude due to the increased workload of programming the autopilot and potential for human errors. Pilots should hand fly the aircraft to a safe altitude and engage the autopilot if desired when time and workload permit. Consider setting the autopilot bugs prior to departure to reduce the amount of workload associated with setting up and engaging the auto pilot.

En Route Climb Procedure (Flow Pattern)

a. Airspeed – 70-80 KIAS

b. Throttle Control – Full (push full in)

c. Mixture Control – Rich (above 3000 feet pressure altitude, lean for maximum RPM)

·Note·

For maximum performance climb speeds refer to Section 5, figure 5-6, maximum rate of climb at 2550 lbs.

Cruise

Complete the cruise checklist as a flow pattern when time and workload permit. Allow the aircraft to accelerate to cruise speeds before setting the desired cruise power setting. Ensure adequate fuel reserves remain for the intended destination. Normal cruise power settings are between 70% and 75% power (2100 RPM to 2700 RPM) with mixture setting for best power or best economy.

For engine break-in, cruise at a minimum of 75% power until the engine has been operated for at least 25 hours or until oil consumption stabilizes. Operation at high power will ensure proper seating of rings, is applicable to new engines, and engines in service following cylinder replacement or top overhaul of one or more cylinders.

Cruise (Flow Patter)

a. Power – 2100 to 2700 RPM (no more than 75% power recommended)

b. Elevator Trim Control – Adjust

c. Mixture Control – Lean (for desired performance or economy)

d. FMS/GPS – Review and Brief (OBS/SUSP softkey operation for holding pattern procedure (IFR))

Descent

Descents should be planned during cruise considering the amount of altitude to lose, distance and time to destination, ATC restrictions, obstacle/terrain clearance, desired rate of descent, and engine care. Use the vertical navigation function of the GPS to assist descent planning. To manage workload, complete the descent checklist at the top of descent or at least 20 minutes from the destination. Set appropriate frequencies and review weather to determine the active runway. Verify GPS units are programmed as desired for the arrival and approach into the airport.

Power should be used during descent to manage airspeed and maintain engine temperatures as desired. Maintain airspeed within the green arc if turbulence is expected or encountered during the descent. Complete the descent checklist as a flow pattern when time and workload permit upon initial descent to land. Reference the checklist to verify all items are complete once the flow has been completed.

Descent Procedure (Flow Pattern)

a. Power – As Desired

b. Mixture – Adjust (if necessary to make engine run smoothly)

c. Altimeters:

   1. PFD (BARO) – Set

   2. Standby Altimeter – Set

d. ALT Select – Set

e. CDI Softkey – Select Nav Source

f. FMS/GPS – Review and Brief (OBS/SUSP softkey operation for holding pattern procedure (IFR))

·Caution·

The G1000 HSI shows a course deviation indicator for the selected GPS, NAV1, NAV2 navigation source. The G1000 HSI does not provide a warning flag when a valid navigation signal is not being supplied to the indicator. When a valid navigation signal is not being supplied, the course deviation bar (D-BAR) part of the indicator is not shown on the HSI compass card. The missing D-BAR is considered to be the warning flag.

·Warning·

When the autopilot is engaged in NAV, APR or BC operating modes, if the HSI navigation source is changed manually, using the CDI softkey, the change will interrupt the navigation signal to the autopilot and will cause the autopilot to revert to roll mode operation. No aural alert will be provided. In roll mode the autopilot will only keep the wings level and will not correct the airplane heading or course. Set the heading bug to the correct heading and select the correct navigation source on the HSI, using the CDI softkey, before engaging the autopilot in any other operating mode.

g. Fuel Selector Valve – Both

h. Wing Flaps – As Desired (Up - 10^0 below 110 KIAS)

(10^0 to Full below 85 KIAS)

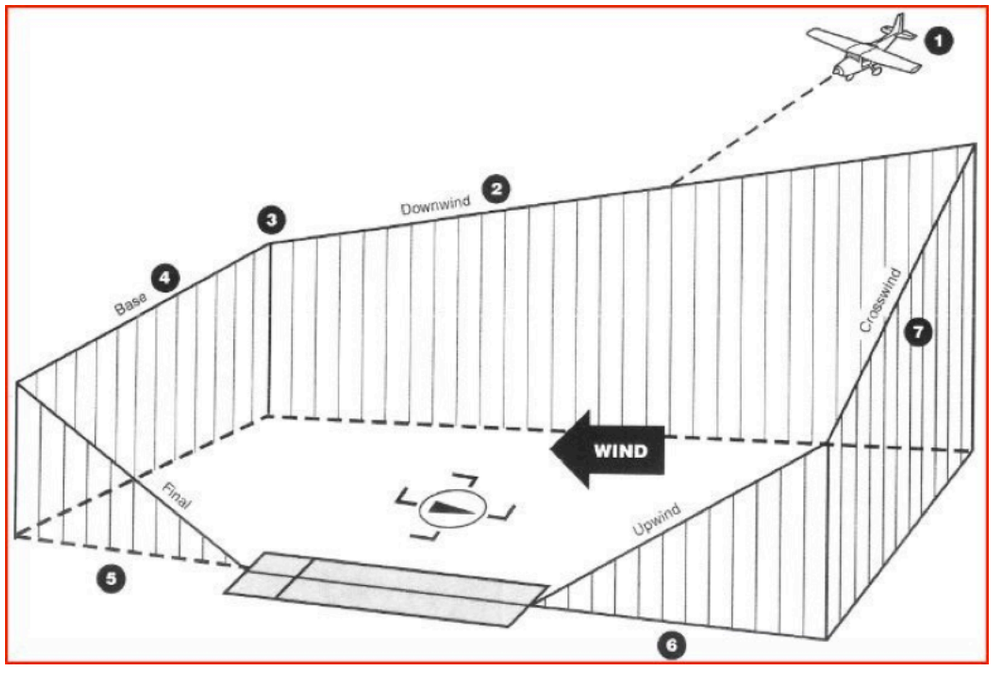
Before Landing

Complete the before landing checklist as a flow pattern prior to entering the traffic pattern when time and workload permit. Slow the aircraft early enough to allow for an easy transition into the traffic flow and enough time to ensure the aircraft is configured for landing. The following profile describes a normal traffic pattern. Pilots should use the profile as a guide when entering the traffic pattern on the downwind leg and modify as appropriate for base entry or straight in approaches.

Before Landing Procedure (Flow Pattern)

a. Pilot and Passenger Seat Backs – Most Upright Position
b. Seats and Seat Belts – Secured and Locked
c. Fuel Selector Valve – Both
d. Mixture Control – Rich
e. Land and Taxi Light Switches – On
f. Autopilot – Off
g. Cabin Power 12V Switch – Off

Traffic Pattern Profile



Traffic Pattern	Power	≈ Airspeed
Downwind	2200 RPM	95 KIAS
Abeam	1500 RPM	85 KIAS
Base	1500 RPM	75 KIAS
Final	As required	65 KIAS

1. Entering Downwind:
   a. Complete before landing checklist
   b. Enter traffic pattern at a 45^0 angle to landing runway
   c. Power – 2200 RPM
   d. Airspeed – ≈ 100 KIAS
2. Downwind Leg:
   a. Power – 2200 RPM
   b. Airspeed – ≈ 95 KIAS

Abeam Touch Down Zone:

   a. Power – 1500 RPM
   b. Airspeed – ≈ 90 KIAS
   c. Extend Flaps to 10^0
   d. Begin descending at 400-500 FPM

3&4. Base:
   a. At 45^0 to Landing point start your turn to base
   b. Verify ↓ 85 KIAS and Extend 20^0 of Flaps
   c. Airspeed – ≈ 80 KIAS
   d. Maintain a descent rate of 400-500 FPM

5. Final:
   a. Extend Full Flaps
   b. Maintain 70 KIAS
   c. Power as required to maintain glide path and airspeed

Approach

The following instrument approach procedures outline the operating procedures for executing precision, non precision, and GPS approaches. The information describes the best way to configure the aircraft for given instrument procedures, complete checklist items, and configure avionics in the Cessna 172s NAV III G1000 aircraft. The purpose of this section is to supplement the information in the POH and provide greater guidance on the completion of various instrument approach procedures in the aircraft. The techniques outlined in this section may not be inclusive of all variables encountered in the national airspace system. Pilots should follow these standard procedures when applicable and exercise good judgment for non standard procedures.

To reduce workload during the descent and instrument approach procedure follow these recommendation.

- Obtain destination weather information as soon as possible to determine active runways and applicable approaches
- Set up applicable COM and NAV frequencies prior to descent
- Use the autopilot while briefing and preparing for the approach
- Reduce unnecessary communications and distractions during the approach
- Use the descent and before landing flows outlined in this manual to complete checklist and avionics set up procedures. Always reference the checklist after the flow is complete
- Brief the approach using the guidelines listed in this section

Stabilized Approach Criteria

A stabilized approach is critical to a safe, successful landing. A stabilized approach is characterized by a constant angle, constant rate of descent approach profile ending near the touchdown point. Stabilized approach criteria apply to all approaches including practice power off approaches.

VFR Stabilized Approach Definition

All briefings and appropriate checklists should be completed by 500 feet AGL in visual conditions.

A VFR approach is considered stabilized when ALL of the following criteria are achieved by 500 feet AGL:

- Proper Airspeed
- Correct Flight Path
- Correct Aircraft Configuration for Phase of Flight
- Appropriate power setting for aircraft configuration
- Normal angle and rate of descent
- Only minor corrections are required to correct deviations

A go around must be executed if the above conditions are not met and the aircraft is not stabilized by 500 feet AGL.

IFR Stabilized Approach Definition

All briefings and appropriate checklists should be completed by 1000 feet AGL for instrument conditions.

An IFR approach is considered stabilized when all of the following criteria are met from 1000 feet AGL and continuous to touchdown:

- Proper airspeed
- Correct flight path
- Correct aircraft configuration for phase of flight
- Appropriate power setting for aircraft configuration
- Normal angle and rate of descent
- Only minor corrections with pitch and power are required to correct airspeed and glide path deviations
- Normal bracketing (+/- 5^0) is used to correct for lateral navigation deviations

DO NOT change flap configuration after crossing the FAF until the runway is in sight and landing is assured,

A missed approach must be executed if the above conditions are not maintained during an instrument approach.

Procedures

Emphasis should be placed on maintaining stability during the entire approach.

Approach Briefing

The purpose of an approach briefing is to prepare the pilot to execute an instrument approach procedure. Pilots should brief the instrument approach procedure when time and workload permits. Preferably, the approach should be briefed approximately 20 minutes prior to the IAF or start of vectors. The approach briefing should include the following items:

- Type of procedure and runway (e.g. ILS 23)
- Transition to final (vectors or IAF)
- Applicable NAV and COM frequencies
- DA/MDA
- MAP and missed approach procedure

Sample approach briefing

This will be a _____ (ILS, GPS…) approach to runway _____ via the _____ transition (VTF or IAF). The proper navigation source (GPS, VLOC) for the approach is selected and the proper course is set in the HSI. Applicable approach frequencies are tuned and identified. Final approach speed is _____ KIAS with approach flaps (10^0) set prior to FAF. Call out 1000 feet, 500 feet and 100 feet above the minimums. The minimum altitude for the approach is _____feet. For a _(Circle to land or Straight in) Approach. The missed approach procedure is climb to _____ altitude and turn left/right to the _____fix and hold.

Procedure – Precision Approach

The following provides guidance for executing a precision approach using vectors to final or full procedure as the transition. The precision approach profile may be used for ILS, LPV, and LNAV/VNAV approaches or any approach that has lateral ad vertical course guidance.

Phase of Approach	Power	Airspeed
Start of Vectors	2300 RPM	110 KIAS
Final Intercept	2100 RPM	90 KIAS
½ Scale below Glide slope	2100 RPM	90 KIAS
FAF Inbound	1800 RPM	90 KIAS
Missed Approach	Full Power	74 KIAS

Avionics Configuration

GPS

- Load the approach with the assigned transition (VTF or IAF)
- Verify all Flight Plan waypoints are correct including course reversals
- Activate the approach at the start of vectors or when cleared direct to the IAF
- Verify all approach frequencies are tuned and identified
- Verify the navigation mode switches from GPS to VLOC on an ILS approach when inbound to FAF

MFD

- Reference electronic charts for approach information ad briefing
- Reference the electronic checklist at the completion of the descent and before landing flows

PFD

- Set the decision altitude in the baro altitude once complete with approach briefing
- Set the HDG bug for the wind correction heading once established inbound on the final approach course

Non Precision Approach Procedure

The following provides guidance for executing a non precision approach sing vectors to final or full procedure as the transition. The non precision profile may be used for VOR and GPS overlay approaches or any approach that has only lateral course guidance.

Phase of Approach	Power	Airspeed
Start of Vectors / IAF	2100 RPM	90 KIAS
Final Intercept	2100 RPM	90 KIAS
2 NM to FAF	1800 RPM	90 KIAS
FAF Inbound	1500 RPM/1800 RPM	90 KIAS
Missed Approach	Full Power	74 KIAS

Avionics Configuration

GPS

- Load the approach with the assigned transition (VTF or IAF)
- Verify all flight plan waypoints are correct including course reversals
- Activate the approach at the start of vectors or when cleared direct to the IAF
- Verify all approach frequencies are tuned and identified
- Verify the navigation mode is set as required (GPS or VLOC)

MFD

- Reference electronic charts for approach information and briefing
- Reference the electronic checklist at the completion of the descent and before landing flows

PFD

- Set Baro altitude with MDA once complete with approach briefing
- Set the heading bug for wind correction heading once established inbound on the final approach course

GPS Approach Procedures

The following provides guidance for executing a classic GPS approach using vectors to final or full procedure as the transition. Use the profile for executing a partial panel approach in the event of a PFD failure.

Phase of Approach	Power	Airspeed
Start of Vectors / IAF	2100 RPM	90 KIAS
Final Intercept	2100 RPM	90 KIAS
2 NM to FAF	1800 RPM	90 KIAS
FAF Inbound	1500 RPM/1800 RPM	90 KIAS
Missed Approach	Full Power	74 KIAS

GPS

- Load the approach with the assigned transition (VTF or IAF), always select the IAF for partial panel approaches
- Verify all waypoints are correct including course reversals
- Activate the approach at the start of vectors or when cleared direct to the IAF
- Verify all approach frequencies are tuned and identified
- Verify the navigation mode is set as required (GPS or VLOC)

MFD

- Reference electronic charts for approach information and briefing
- Reference the electronic checklist at the completion of the descent and before landing flows

PFD

- Set Baro altitude for the MDA once the approach briefing is complete
- Set the heading bug for wind correction heading once established inbound on the final approach course

Missed Approach

A missed approach should be executed any time the approach does not meet the stabilized approached criteria outlined in this manual. Additionally, a missed approach should be executed in pursuant 91.175 (e)(1)(i), (e)(1)(ii), or (e)(2). In brief, when an aircraft is operating below MDA, when at the MAP or DA/DH and its use is required, or whenever an identifiable part of the airport is not distinctly visible to the pilot in a circling approach.

GO-Around

A go around should be executed anytime an approach does not meet the stabilized approach criteria outlined in this manual for instrument or visual conditions. A go around should be completed from memory since it is a time critical maneuver.

In addition to the stabilized approach criteria, execute a go around/ missed approach for these conditions:

- Excessive ballooning during round out or flare
- Excessive bouncing or porpoising
- Landing beyond the first 1/3 of the runway
- Any condition when a safe landing is in question

The first priority of executing a go around is to stop the aircraft's descent. Smoothly and promptly apply full power while simultaneously leveling the wings and pitching the aircraft to stop the descent. Maintain coordination while adding power by applying rudder pressure. Retract flaps slowly to 10^0. Do not fully retract flaps at this point in the go around because it may lead to excessive altitude loss.

Begin pitching for a climb attitude once the aircraft's descent rate has been stopped. Pitch for Vx if obstacle clearance is an issue. Pitch for Vy for all other situations. Retract flaps to 0^0 once the aircraft is climbing, and clear of all obstacles and at or above 65 KIAS.

Go-Around Procedure (Memory)

a. Throttle – Full

b. Wing Flaps – Retract to 20^0

c. Climb Speed – 62 KIAS Vx

d. Wing Flaps - 10^0 (as obstacle is cleared), then Up (after reaching a safe altitude and 65 KIAS)

Landing

Final Approach Speeds	C-172s
30^0 Flaps	65 KIAS
20^0 Flaps	70 KIAS
10^0 Flaps	75 KIAS
Short Field (30^0 Flaps)	61 KIAS
Max Demonstrated X-Wind	15 KIAS

Note: Speeds are for zero winds. Increase accordingly to compensate for headwinds or x-winds.

Normal Landing

Normal Landings should be made with 30^0 flaps. Final approach speeds should be adjusted to account for gusts exceeding 10 kts by adding half the gust factor. Reduce power smoothly and begin slowing from final approach speed at a time that allows an easy transition from final descent to round out and flare with minimum floating or ballooning. Touch downs should be made on the main wheels first at speeds slightly above stall. Gently lower the nose wheel after the mains are on the ground.

Short Field Landing

Landings in short runways should be made with 30^0 flaps. Final approach speeds should be adjusted to account for wind gusts exceeding 10 kts by **adding half the gust factor**. Progressively reduce power after clearing all approach obstacles. Proper airspeed and power control should result in an approach with minimal floating in ground effect and excessive sink rates during the approach. Touchdown should be made on the main wheels first. Immediately after touchdown, ensure power idle, lower the nose wheel and brake as required. To decrease stopping distances consider retracting the flaps and holding the control yoke full aft. Emphasis should be placed on the accuracy of the touchdown to ensure enough runway remains after touchdown to stop the aircraft.

Soft Field Landing

Cessna 172s is approved for soft field or turf runways. Always ensure that the quality and condition of the runway surface is adequate to support the aircraft. Avoid turf runways with long grass, wet or soggy soil, large ruts or holes. A soft field approach is similar to a normal landing and approach. Touchdowns should be made on the main wheels first. A soft touchdown will reduce the stress on the landing gear and make it easier to keep the nose wheel from digging into the turf and possible loss of directional control. Keep the nose wheel off the ground as long as possible by applying sufficient back pressure to the control yoke. A little power can be added immediately after touchdown to aid in keeping the nose wheel off the ground. Braking should be minimized. Excessive braking could lead to a loss of directional control on the runway. Higher power settings will be required to taxi on a soft field.

Crosswind Landing

Crosswind landings should be made with minimum flap setting required for the field length. It is recommended to crab the aircraft into the wind sufficient to track the aircraft along the extended centerline of the runway. Hold the crab until the beginning of the round out. At the start of the round out, enter a slip by applying ruder pressure to align the longitudinal axis of the aircraft with the runway and simultaneously apply aileron to keep the aircraft tracking the runway centerline. Touchdowns should be made on the upwind main landing gear first followed by the downwind main landing gear and nose gear. Hold aileron correction into the wind during the rollout and apply rudder as necessary to maintain directional control.

After Landing

Complete the after landing checklist as a flow pattern after clearing the active runway and after a full stop. Ensure the pitot heat is turned off. The mixture can be leaned if desired. Set the mixture by leaning for max RPM rise.

After Landing Procedure (Flow Pattern)

a. Wing Flaps – Up

b. Mixture – Lean as required

c. Landing Light – Off

d. Taxi Light – On (if required)

Arrival/Engine Shutdown

Complete the shutdown checklist as a flow pattern. Verify with the checklist to ensure all items have been accomplished when completed with the flow pattern. The aircraft should be parked on a ramp or in a hangar If the aircraft is parked outside, it should be chocked ad tied down if possible.

Engine Shutdown Procedure (Flow Pattern)

a. Brakes – Hold

b. Throttle Control – Idle (Pull full aft)

c. Electrical Equipment – Off

d. Avionics Switch (BUS 1 and BUS 2) – Off

e. Mixture Control – Idle Cutoff (pull full aft)

f. Magnetos Switch – Off

g. Master Switch (ALT and BAT) – Off

h. Standby Battery Switch – Off

i. Control Lock – Install

j. Fuel Selector Valve – Left or Right (to prevent cross feeding between tanks)

k. Chocks, Tie-downs, Pitot Cover – As Required

·Note·

<u>Never leave the parking brake on.</u> FBO's may be required to move the aircraft in your absence. During the movement bald tires may result or damage to the brake system.

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Section 4

Maneuvers

Section 4 – Maneuvers

General

The following maneuvers should be completed with a minimum recovery altitude of 1500 feet AGL. Follow these guidelines for set up and execution of the following maneuvers,

Steep Turns

Enter this maneuver at 105 KIAS by smoothly banking the aircraft to 45^0 (Private) / 50^0 (Commercial) and simultaneously adding back pressure to maintain altitude. Maintain coordination with rudder. Additional power may be required to maintain airspeed. Continue the turn for 360^0. Start the roll out approximately 10^0 before completing the full turn and simultaneously releasing back pressure. Reduce any power that was added during the maneuver.

Execution

a. Execute Clearing Turns

b. Airspeed 105 KIAS

   Power 2300 RPM

c. Bank Angle 45^0 (Private) or 50^0 (Commercial)

Maneuvering During Slow Flight

Practice this maneuver with a variety of flap configurations while climbing, descending and turning. Enter the maneuver in level flight and smoothly reduce power. Maintain altitude while the aircraft slows to the desired airspeed and trim the aircraft. Add flaps as desired at Vfe. Add power as necessary to maintain the desired altitude. Maintain coordination throughout the maneuver with rudder control. Recover from this maneuver if a stall is encountered.

Execution

a. Execute Clearing Turns

b. Reduce Power to 1500 RPM

c. Flaps as desired

d. Bank Angle as desired (20^0 Maximum)

e. Power as required to maintain altitude, climb or descend

f. Airspeed – an airspeed at which any further increase in angle of attack, increase of load factor, or reduction in power would result in an immediate stall (current PTS standards)

Recovery

a. Reduce angle of attack and level wings

b. Apply full power

c. Retract Flaps to 20^0

d. Airspeed at or above Vx – Retract flaps to 10^0

d. Accelerate to Vy – Retract Flaps to 0^0

Power Off Stalls

Practice this maneuver with varying flap configurations. Enter this maneuver from a level attitude by reducing the power and adding flaps as desired at Vfe. At 65 KIAS (Full Flaps), 70 KIAS (20^0 Flaps), or 75 KIAS (10^0 Flaps), establish a descent of approximately 500 FPM, straight or turning. Once a stabilized descent is established, reduce power to idle and gradually increase pitch to a normal touchdown attitude (10-12^0 approximately). Adjust pitch to reduce airspeed approximately 1 kt/second. Recovery can be initiated at the incipient phase or full stall.

Execution

a. Execute Clearing turns

b. Reduce Power to 1500 RPM

c. Extend Flaps As desired

d. Establish descent of 500 feet per minute

e. Reduce throttle to idle

f. Slowly pitch up for stall

Recovery

a. Reduce Angle of attack

b. Apply full power

c. Retract Flaps 20^0

d. Accelerate to Vx and retract flaps to 10^0

e. Accelerate to Vy and retract flaps to 0^0

f. Maintain altitude during the recovery procedure

Power On Stalls

Practice this maneuver with 0^0 and/or 10^0 flaps, straight and turning. Enter the maneuver from level flight by reducing power and adding flaps as desired at Vfe. Slow the aircraft to Vr while maintaining altitude. At Vr smoothly apply full power and pitch the aircraft at an angle to induce a stall. Apply rudder to maintain coordination. Recover from this maneuver at the incipient phase or full stall.

Execution

a. Execute clearing turns

b. Reduce power to 1500 RPM

c. Flaps 0^0 or 10^0

d. Airspeed – Slow to Vr

e. Apply full power

f. Increase pitch angle to induce stall

Recovery

a. Reduce angle of attack

b. Verify full power

c. Accelerate to Vy

d. Flaps Retract

Autopilot Stall Recognition

The purpose of this maneuver is to identify the conditions when a stall with the autopilot engaged may occur, recognize the affects of an impending autopilot stall and learn the recovery procedure. Do not exceed any autopilot limitations during this maneuver. The maneuver is started by programming the autopilot for conditions it is not capable of maintaining (excessive climb rate, insufficient power…). This maneuver will not be executed to a full stall condition. Recovery will be initiated at the first indication of a stall by disconnecting the autopilot and following the stall recovery procedure.

AP Stall Recognition (Power Off)

a. Execute clearing turns

b. Reduce power 1500 RPM

c. Engage Heading and Altitude modes on autopilot

d. flaps 10^0

e. Reduce power to idle

·Note·

Autopilot will increase the angle of attack to maintain altitude sacrificing airspeed. Recovery will be performed at a speed no lower than the limitation of the autopilot approximately 1.2 Vs.

Recovery

a. Disconnect Autopilot

b. Reduce angle of attack

c. Apply full power

d. Accelerate to Vy

e. Retract Flaps to 0^0

AP Stall Recognition (Power On)

a. Execute clearing turns

b. Flaps 0^0

c. Reduce power 1500 FPM

d. Engage Heading and VS with a 2000 FPM climb

e. Apply power 2200 RPM

·Note·

Autopilot will increase the angle of attack to increase altitude sacrificing airspeed. Recovery will be initiated at a speed no lower than 70 KIAS.

Recovery

a. Disconnect autopilot and simultaneously

b. Reduce angle of attack and level wings

c. Verify Full power

The remaining ground reference maneuvers and commercial maneuvers are located in appendix A of this manual. Refer to this appendix for procedures on the remaining maneuvers.

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Section 5

Emergency & Abnormal Procedures

General

Section 3 of the Pilot's Operating Handbook provide the procedures for handling emergency and abnormal system and/or flight conditions which, if followed, will maintain an acceptable level of airworthiness and reduce operational risk. The guidelines described in these sections are to be used when an emergency and/or abnormal condition exists and should be considered and applied as necessary.

Checklist Completion for Abnormal Procedures

Completion of abnormal procedures should be done using the do-list method. The appropriate checklist should be directly referred to and each item should be completed in the order prescribed.

Checklist Completion for Emergency Procedures

Emergency checklists should be completed from memory. The Emergency Procedures section of the POH identifies checklist items for emergency procedures that must be memorized. Execution of these procedures is considered time critical and is done without reference to a checklist. The checklist should only be referenced during an emergency if time permits.

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Section 6

Performance

General

To determine what performance to expect from the airplane under various ambient and field conditions, refer to Section 5 – Performance, of the POH. Performance data is presented for takeoff, climb, and cruise (including range & endurance).

Time and Distance for given Ground Speed

	GS								
NM	80	90	100	110	120	130	140	150	160
10	0:07	0:06	0:06	0:05	0:05	0:04	0:04	0:04	0:03
15	0.11	0.1	0.09	0.08	0.08	0.07	0.06	0.06	0.06
20	0:15	0:13	0:12	0:10	0:10	0:09	0:08	0:08	0:07
25	0.19	0.17	0.15	0.14	0.13	0.12	0.11	0.1	0.09
30	0:22	0:20	0:18	0:16	0:15	0:13	0:12	0:12	0:11
35	0.26	0.23	0.21	0.19	0.18	0.16	0.15	0.14	0.13
40	0:30	0:26	0:24	0:21	0:20	0:18	0:17	0:16	0:15
45	0.34	0.3	0.27	0.25	0.23	0.21	0.19	0.18	0.17
50	0:37	0:33	0:30	0:27	0:25	0:23	0:21	0:20	0:18
55	0.41	0.37	0.33	0.3	0.28	0.25	0.24	0.22	0.21
60	0:45	0:40	0:36	0:32	0:30	0:27	0:25	0:24	0:22
65	0.49	0.43	0.39	0.35	0.33	0.3	0.28	0.26	0.24
70	0:52	0:46	0:42	0:38	0:35	0:32	0:30	0:28	0:26
75	0.56	0.5	0.45	0.41	0.38	0.35	0.32	0.3	0.28
80	1:00	0:53	0:48	0:43	0:40	0:36	0:34	0:32	0:30
85	0.64	0.57	0.51	0.46	0.43	0.39	0.36	0.34	0.32
90	1:07	1:00	0:54	0:49	0:45	0:41	0:38	0:36	0:33
95	1.11	1.03	0.57	0.52	0.48	0.44	0.41	0.38	0.36
100	1:15	1:06	1:00	0:54	0:50	0:46	0:42	0:40	0:37
200	2:30	2:13	2:00	1:49	1:40	1:32	1:25	1:20	1:15
300	3:45	3:20	3:00	2:43	2:30	2:18	2:08	2:00	1:52
400	5:00	4:26	4:00	3:38	3:20	3:04	2:51	2:40	2:30
500	6:15	5:33	5:00	4:32	4:10	3:50	3:34	3:20	3:07
600	7:30	6:40	6:00	5:27	5:00	4:36	4:17	4:00	3:45
700	8:45	7:46	7:00	6:21	5:50	5:23	5:00	4:40	4:22
800	10:00	8:53	8:00	7:16	6:40	6:09	5:42	5:20	5:00
	TIME								

Performance			
Departure		Destination A	Destination B
MMU	Ident.	JST	MFD
-24ft	Press. Alt.	2119ft	
800ft	Dens. Alt.	2100ft	
6,000ft	Longest Rwy.	7,000ft	
4,000ft	Shortest Rwy.	3,700ft	
925ft/1,685 ft	T/O Roll / 50ft Obst.	215ft/1,955 ft	
	LDG. Roll / 50ft Obst.	580ft/1,345 ft	
2,248	G. W.	2,248	
2,240	T/O Weight	2,240	
	LDG. Weight	2,130	2,144
42.35	T/O CG	42.35	
	LDG. CG	42.04	42.08
CG Range at Max. G.W. :			38.5 - 47.3
	Time		
	Total Usable Fuel :		
	Total Enroute Fuel Burned:		
	Remaining Fuel:		

Time, Fuel, and Distance to Climb

CONDITIONS:

Flaps Up
Full Throttle
Standard Temperature

Pressure Altitude Feet	Temp °C	Climb Speed KIAS	Rate of Climb FPM	From Sea Level		
				Time Minutes	Fuel Used Gallons	Distance NM
Sea Level	15	74	730	0	0.0	0
1000	13	73	695	1	0.4	2
2000	11	73	655	3	0.8	4
3000	9	73	620	4	1.2	6
4000	7	73	600	6	1.5	8
5000	5	73	550	8	1.9	10
6000	3	73	505	10	2.2	13
7000	1	73	455	12	2.6	16
8000	-1	72	410	14	3.0	19
9000	-3	72	360	17	3.4	22
10000	-5	72	315	20	3.9	27
11000	-7	72	265	24	4.4	32
12000	-9	72	220	28	5.0	38

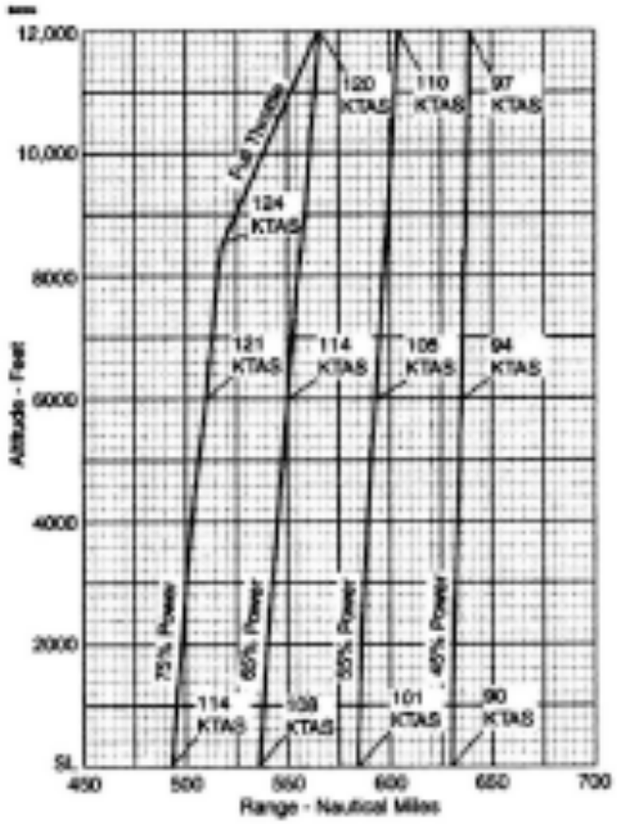
NOTE

1. Add 1.4 gallons of fuel for engine start, taxi and takeoff allowance.
2. Mixture leaned above 3000 feet pressure altitude for maximum RPM.
3. Increase time, fuel, and distance by 10% for each 10^0 C above standard temperature.
4. Distances shown are based on zero winds.

RANGE PROFILE
45 MINUTES RESERVE
53 GALLONS USABLE FUEL

CONDITIONS:
2550 Pounds
Recommended Lean Mixture for Cruise at all altitudes

Standard Temperature
Zero Wind



NOTE

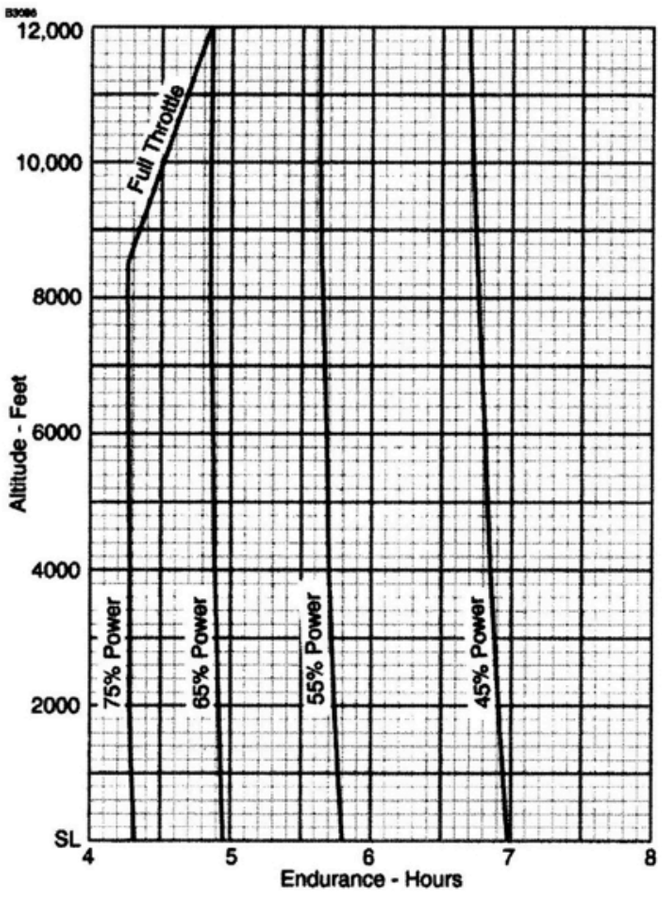
- This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the distance during a normal climb.
- Cruise speeds are shown for an airplane equipped with speed fairings. Without speed fairings, decrease speeds shown by 2 knots.

Figure 5-9

ENDURANCE PROFILE
45 MINUTES RESERVE
53 GALLONS USABLE FUEL

CONDITIONS:
2550 Pounds
Recommended Lean Mixture for Cruise at all altitudes

Standard Temperature



NOTE

This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the time during a normal climb.

Figure 5-10

Section 7

Supplementary Information

Section 7 – Supplementary Information

General

This section should be used as a supplement for the planning and execution of all flights in a NOVA aircraft. Although an excellent resource, this information will not guarantee a safe flight. Minimizing flight risk requires sound judgment and sensible operating practices. Safety of flight ultimately depends upon the decisions made by you, the pilot.

Safe flights should be conducted in accordance with regulations, ATC clearances, personal capabilities, and the aircraft operating limitations described in the FAA Approved Airplane Flight Manual and Pilots Operating Handbook (POH). Procedures in this publication are derived from procedures in the FAA Approved Airplane Flight Manual (AFM). NOVA has attempted to ensure that the data contained here agrees with the data in the AFM. If there is any disagreement, **the Airplane Fight Manual is the final authority.** For operations outside the United States, refer to the appropriate regulations for that country. This publication should be in the pilot's possession during all flight operations.

Pilot Qualification and Training

The plot in command of any NOVA aircraft is responsible for its safe operation. It is recommended that all pilots operate in accordance with the policies and procedures prescribed within this publication. In no case does this document relieve the pilot in command from the responsibility of making safe decisions regarding the operation of the aircraft.

Training

All pilots must adhere to NOVA Aviation Service Agreement that they signed prior to beginning training or renting of NOVA aircraft.

Medical Certificates

In order to exercise the privileges of a private pilot certificate the pilot must hold a third class medical, which is valid for 5 years from the date of issue (2 years if the person is over 40 years of age).

Pilot Duty Considerations

Duty Time and Rest

Pilots should avoid a duty period greater than 14 hours including a maximum of 8 hours of flight instruction. A pilot should have a 10 hour rest period prior to flying the following day. Pilots should consider non-flight related working periods as duty time.

Physiological

Intoxicants

Pilots should not consume alcohol or other intoxicants within 12 hours prior to flying and should always consider the lasting effects of alcohol the following day.

Blood Donations

A pilot should not operate an aircraft within 72 hours after a blood donation or transfusion due to temporary lowering of oxygen carrying capacity of blood following a blood donation or transfusion.

Scuba Diving

A pilot or passenger who intends to fly after scuba diving should allow the body sufficient time to rid itself of excess nitrogen absorbed during the dive. The recommended wait times are as follows:

- Wait 12 hours – if flight will be below 8,000 feet pressure altitude and dive did not require a controlled ascent
- Wait 24 hours – if flight will be above 8,000 feet pressure altitude or dive required a control ascent

Aircraft Maintenance

NOVA aircraft will be maintained in accordance with the instructions for Continued Airworthiness found in the Airplane Flight Manual. All maintenance will be performed by qualified A&P mechanics.

Grounding of Aircraft

A NOVA pilot or mechanic has the authority to ground an aircraft anytime it is determined to be not airworthy.

Flight Planning

Pilots are encouraged to file VFR or IFR flight plans for all cross country flights. Pilots should always plan an alternate, whether operating VFR or IFR. The pilot should complete the following flight planning responsibilities: Determine the best route and altitude considering; winds aloft, freezing levels, cloud bases and tops, turbulence, terrain, airspace and TFRs.

- Determine alternate airport
- Calculate fuel requirements
- Verify aircraft is within weight and balance limitations
- Calculate takeoff and landing distances. Verify runway lengths for intended airports
- File flight plan

Weather

A critical factor in a successful flight is the pilot's evaluation of weather conditions. Many weather related accidents could have been prevented during preflight if the pilot had thoroughly evaluated the weather conditions. The following weather resources will be useful for evaluating the weather.

Flight Service Station

800-WX-BRIEF

Aviation Weather Center

http://www.aviationweather.gov

Direct Users Access Terminal Service (DUATS)

http://www.duats.com

National Weather Service

http://www.nws.noaa.gov

The go/no-go decision and the route to the intended destination greatly depend on the weather at the departure airport, along the route and destination. The pilot's ability to interpret and understand aviation weather is critical to the safety of flight. Follow the steps below when assessing the weather for every flight.

Overview

The first step to understanding the weather conditions along the intended route is to assess the big picture. The pilot should become familiar with pressure systems, frontal systems, precipitation, areas of marginal VFR and IFR conditions, and areas of icing and turbulence. Weather products available:

- Surface analysis Chart
- Weather radar
- Satellite imagery

Hazards to Flight

The second step is to identify any potential hazards for the intended flight. The pilot should become familiar with areas of marginal VFR and IFR conditions, convective activity, and areas of icing and turbulence. Weather products include:

- Weather depiction chart
- AIRMETs, SIGMETs, and Convective SIGMETs
- Weather radar
- Pilot Reports
- Area Forecasts
- Current and forecasted icing potential tools

Current Observations

The third step is to become familiar with the current observations along the intended route of flight. Current weather observations within 50 miles of the departure, intended route and destination airport should be analyzed. Weather products available include:

- METARs
- Pilot Reports

·Note·

Go to http://adds.aviationweather.gov/java/ for an interactive weather tool.

Forecasted Weather

The fourth step is to understand what the weather is expected to do during our flight. Evaluate the weather +/- 2 hours from your estimated time of arrival at the destination or planned alternate. Weather products available include:

- TAFs
- Area Forecasts
- Prognostic Charts
- Winds and Temperature Aloft
- AIRMETs, SIGMETs, and Convective SIGMETs

NOTAMS

The fifth step is to become aware of any NOTAMs that may affect the flight. Pay close attention to any TFR's that may interfere with your routing.

Thunderstorm Flying

Never regard a thunderstorm lightly – even when radar observers report the echoes are of light intensity. Avoiding thunderstorms is the best policy. The following are Do's and Don'ts of thunderstorm avoidance:

- Don't land or takeoff in the face of an approaching thunderstorm. A sudden gust front or low level turbulence could cause loss of control.
- Don't attempt to fly under a thunderstorm even if you can see through the other side. Turbulence and wind shear under the storm could be disastrous.
- Don't trust the visual appearance to be reliable indicator of the turbulence inside a thunderstorm.
- Avoid by at least 20 miles any thunderstorm indentified as severe or giving an intense radar echo. This is especially true under the anvil of a large cumulonimbus.
- Circumnavigate the entire area if the area has 6/10 thunderstorm coverage.
- Remember that vivid and frequent lighting indicates the existences of a strong thunderstorm.

Regard as extremely hazardous any thunderstorm with tops 35,000 feet or higher, whether the top is visually sighted or determined by radar.

Temperature Minimums

Flight training operations should not be undertaken when the outside air temperature falls below -20^0 Fahrenheit. NOVA aircraft should be preheated if exposed to ground temperatures below 30^0 Fahrenheit for more than 2 hours. Do not operate the engine at speeds above 1800 RPM unless the oil temperature is 100^0 Fahrenheit or higher and oil pressure is within the green arc of the oil pressure gage. Once the engine oil temperature has reached 150^0 Fahrenheit and oil pressure does not exceed the green arc at 2000 RPM, the engine has been warmed sufficiently to accept full power.

Operations in Icing Conditions

·WARNING·

Flight into known icing is prohibited in ALL NOVA aircraft.

A pilot should not take off in an aircraft that has frost, snow, or ice adhering to any external surface.

A pilot can expect icing when flying in visible moisture, such as rain, snow or clouds, and the temperature of the aircraft is below freezing. If icing is detected the pilot should turn on all available anti-icing equipment and do one of two things to exit the icing conditions; get out of the area of visible moisture or go to an altitude where the temperature is above freezing. The warmer altitude may not always be a lower altitude. Proper preflight action includes obtaining information on the freezing level. Report icing conditions to ATC, and if operating IFR, request new routing or altitude if icing is encountered.

In-Flight Considerations

Turns after Takeoff

The recommended turn altitude after takeoff is within 300 feet of pattern altitude, unless obstacle departure procedures or ATC instruction dictate otherwise. When cleared to fly runway heading pilots should maintain the heading that corresponds with the extended centerline of the departure runway until otherwise directed by ATC. Drift correction should not be applied; i.e., runway 04 with an actual magnetic heading of 044^0, fly 044^0.

Weather Status

Pilots should monitor the weather along the route and destination airport for deteriorating conditions using onboard weather resources and ground based weather resources. Enroute Flight Advisory Service, Flight Watch, in generally available on 122.0 anywhere in the contiguous United States. A diversion may be necessary if the weather deteriorates beyond the pilot's qualifications and/or capabilities.

Aircraft Systems Status

Pilots should monitor the flight, engine and system parameters throughout the flight. Verify adequate fuel remains to reach the intended destination.

Pilot Status

Pilots should monitor fatigue and stress levels during the flight. A diversion may be necessary if the pilot has any reason to believe the flight cannot be safely completed.

Situational Awareness

Pilots should maintain situational awareness throughout the entire flight using all available equipment and resources.

Supplemental Oxygen

According to Title 14 CFR Part 91.211, no person may operate an aircraft –

1. At a cabin pressure altitudes above 12,500 feet (MSL) up to and including 14,000 feet (MSL) unless the required minimum flight crew is provided with and uses supplemental oxygen for that part of the flight at those altitudes that is more than 30 minutes in duration;

2. At cabin pressure altitudes above 14,000 feet (MSL) unless the required minimum flight crew is provided with and uses supplemental oxygen during the entire flight time at those altitudes; and

3. At cabin pressure altitudes above 15,000 feet (MSL) unless each occupant of the aircraft is provided with supplemental oxygen.

·Note·

For optimal protection pilots are encouraged to use supplemental oxygen above 10,000 feet during the day and above 5,000 feet during the night.

Flight Safety

In addition to the operating limitations specific to each aircraft type, the following actions are not recommended:

- Parachuting activities
- Hand propped engine starts
- Flight below 500 feet AGL except for takeoff and landing
- Flight beyond the safe gliding distance of land

·Note·

The pilot should ensure that adequate survival gear is readily accessible if flight beyond the safe gliding distance is required.

Sterile Cabin

During sterile cabin operations all distractions such as XM radio, non-flight related materials should be terminated and unnecessary communication with passengers should be minimized. A sterile cabin should be observed during departure, arrival and abnormal/ emergency operations.

Smoking

Smoking is prohibited inside or near all aircraft and hangars. It is the responsibility of the pilot to ensure that their passengers comply with these restrictions.

Incident and Accident Procedures

The pilot shall immediately notify the nearest National Transportation Safety Board field office if an aircraft incident or accident occurs as defined in NTSB Part 830. The proper law enforcement agency and/or search and rescue shall be notified if necessary. The pilot should complete the Aircraft Accident and Incident Report, found in this section, after any accident or incident. The pilot should not discuss the circumstances with anyone not involved with the investigation.

Emergency Landing

If a NOVA aircraft makes an emergency landing at a site not designated as an airport, the pilot should not attempt to take off, but should immediately contact the proper authorities.

Aircraft Incident and Accident Notification

An Aircraft Incident and Accident Report should be completed by the pilot any time a NOVA aircraft sustains any damage or is involved in an accident or incident. The information may useful in a future investigation. The report form is found in this manual.

NTSB Field Office

Southeast – Atlanta	404-562-1666
Southeast – Miami	305-597-4610
North Central	630-377-8177
Northeast – Parsippany	973-334-6420
Northeast – Ashburn	571-223-3930
Central Mountain	303-373-3500
South Central	817-652-7800
Northwest	206-870-2200
Southwest	310-380-5660
Alaska	907-271-5001

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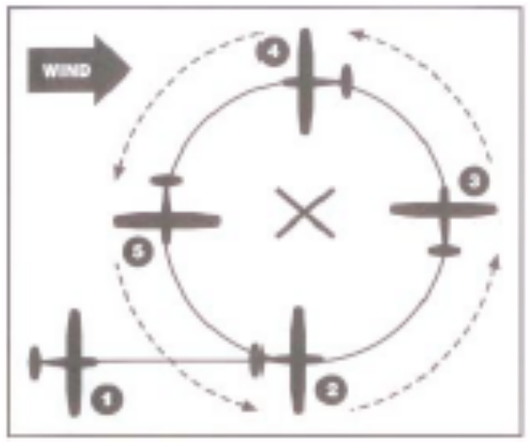
Appendix A

Ground Reference Maneuvers

Appendix – A

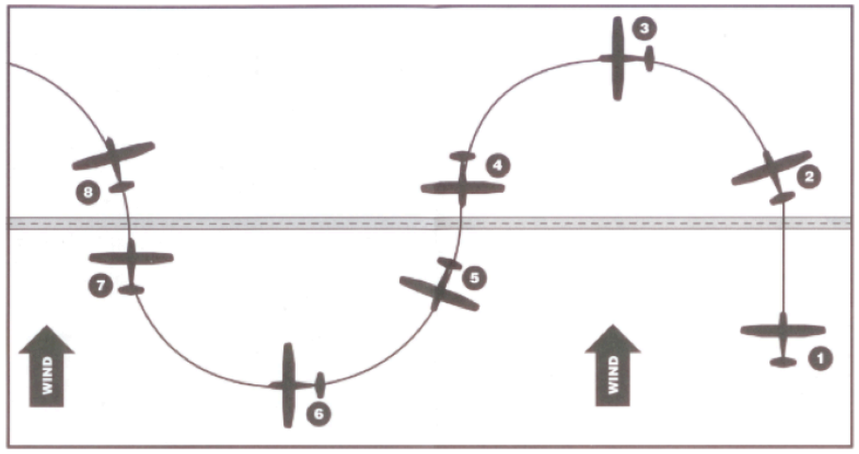
Ground Reference Maneuvers

Turns Around A Point



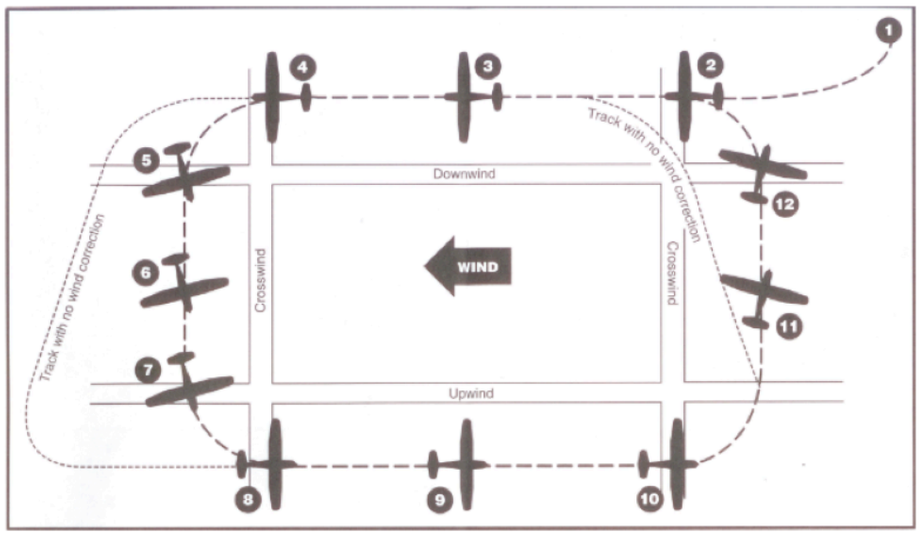
1. Enter on the downwind side of the point of reference.
   a. Power – 2300 RPM
   b. Airspeed ≈ 105 KIAS
   c. Altitude – 800-1000 feet AGL
2.
   a. Once reference point is abeam wing, begin your turn
   b. Steepest bank (45^0) due to highest ground speed
   c. Maintain distance from reference point using bank control and remaining coordinated
3.
   a. Maintain distance from reference point
   b. Gradually decrease your bank angle as airplane turns up wind
   c. Maintain aircraft coordination
4.
   a. Slowest Ground Speed
   b. Shallowest Bank angle
   c. maintain distance from reference point and coordination
5.
   a. Gradually increase bank angle as airplane begins to turn downwind
   b. Maintain distance from reference point
   c. Fly at least 2 turns, and exit at point of entry at the same altitude and airspeed at which the maneuver was started

S-Turns



1. Enter on the downwind side of the line of reference.
   a. Power – 2300 RPM
   b. Airspeed ≈ 105 KIAS
   c. Altitude – 800-1000 feet AGL
2. Cross the line feature wings-level
   Initial Turn is to the left
   This will be the highest ground speed
   Steepest bank angle (do not exceed 45^0)
3. Moderate bank angle and decreasing as airplane begins turn upwind. Maintain coordination throughout maneuver
4. Level wings as you cross the line of reference
5. Slowest ground speed
   Turn in opposite direction
   Shallowest bank angle
6. Moderate bank angle and increasing as airplane begins turn to downwind. Maintain coordination
7. Level the wings crossing the line reference
8. Fastest ground speed
   Exit the maneuver at the same altitude and airspeed when maneuver was started

Rectangle Course



1. Select a rectangle course
   a. Power – 2300 RPM
   b. Airspeed ≈ 105 KIAS
   c. Altitude – 800-1000 feet AGL
   d. Remain ½ to 1 mile outside of selected rectangle course
2. Enter 45^0 to downwind with first course to the left
3. Same KIAS, fastest ground speed

   Maintain distance to boundary

   Crab angle not required
4. Steepest turn for fastest ground speed (max 45^0 bank angle)

   Ease off of bank angle as the wind turns to a crosswind, and ground speed begins to slow
5. Roll out of the turn wings-level, crabbing into the wind

   Turn will be more than 90^0
6. Maintain coordination and crab into wind

   Same airspeed, medium ground speed

   Maintain distance from boundary

7. Start the turn with a medium bank angle

   Reduce bank angle as ground speed slows
8. Roll out wings level, directly upwind

   Turn will be less than 90^0
9. Same indicated airspeed, slowest ground speed

   Maintain distance from boundary

   Crab angle is not required
10. Start a shallow turn for the slowest ground speed

    Gradually increase to a medium bank angle as the ground speed increases. Roll out wings level with a wind correction angle and crab into the wind.
11. Turn will be less than 90^0

    Same indicated airspeed, medium ground speed

    Maintain coordination and crab into the wind
12. Start a medium bank turn, gradually increasing bank angle as ground speed increases

    Turn will be more than 90^0

    Exit at point of entry at the same airspeed and altitude when maneuver was started

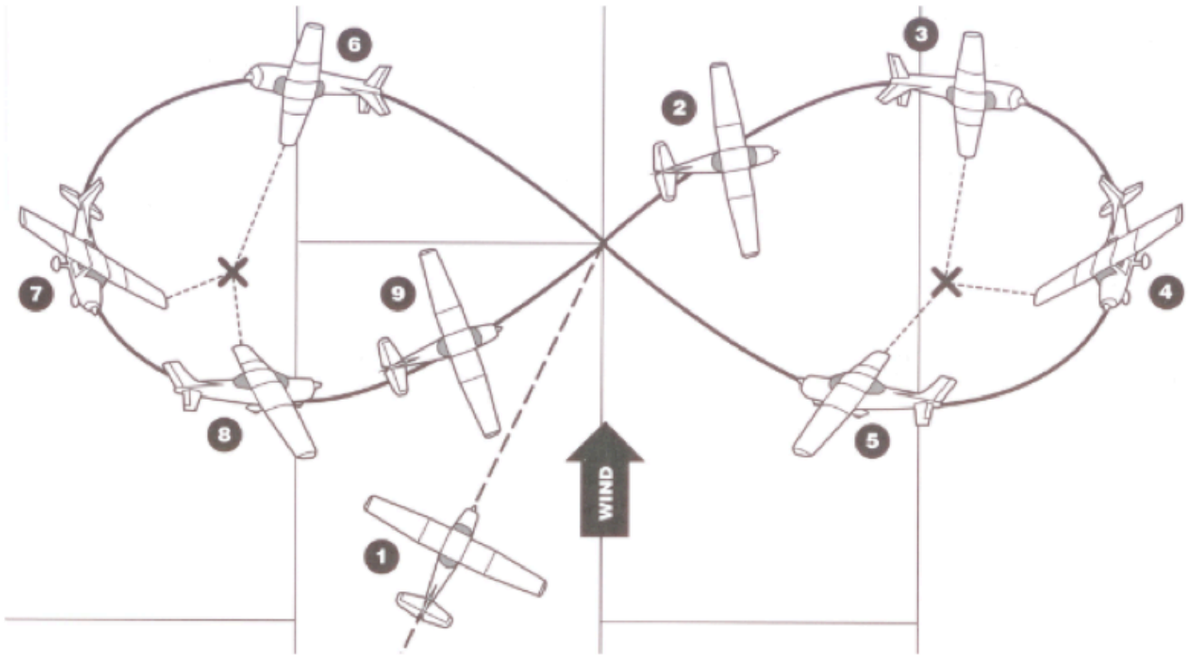
Appendix B

Commercial Maneuvers

Appendix – B

Commercial Maneuvers

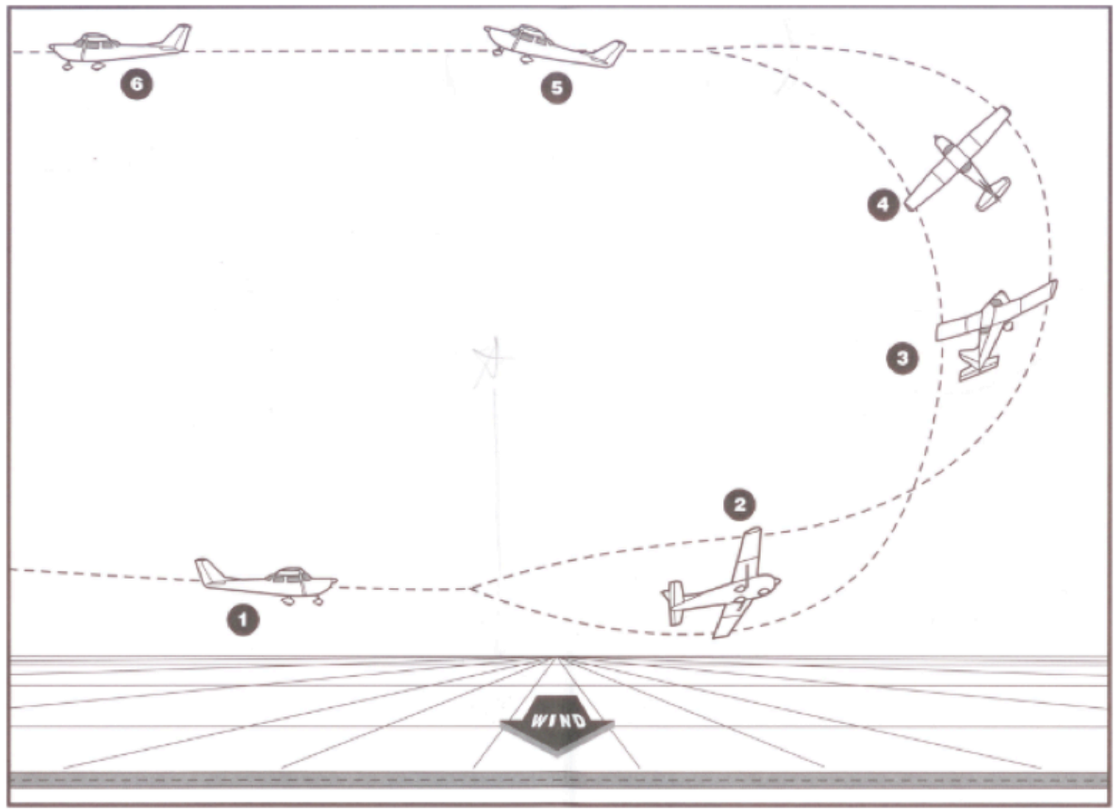
Eights on Pylons



1. Select 2 pylons about ½ a mile apart
   a. Power – 2300 RPM
   b. Airspeed ≈ 105 KIAS
   c. Altitude – 800-1000 feet AGL
   d. Enter maneuver by approach at midpoint of the pylons diagonally
2. Just past the pylon, roll into a right turn to position the wing tip on the pylon
   a. Prevent apparent up down movement of the pylon using aileron
   b. Prevent apparent fore-aft movement of the pylon by using elevator
   c. Follow pylon with the control column

3. Crosswind, ground speed decreases
   If pylon moves forward of your line of sight along the wing tip, apply forward pressure and descend
   Maintain coordination, do not use rudder to “hold” the pylon
4. Upwind, slowest ground speed
   Shallowest bank
   Furthest distance from the pylon
   Lowest pivotal altitude
5. Downwind, fastest ground speed
   Steepest bank
   Closest distance to pylon
   Highest pivotal altitude
   Cross midpoint of pylons wings level
6. Just past the left pylon, roll into a left turn to position wing tip on the pylon
   Prevent up-down movement of the pylon using aileron
   Prevent fore-aft movement of the pylon using elevator
   Follow pylon with the control column
7. Upwind, slowest ground speed
   Shallowest bank
   Furthest distance from pylon
   Lowest pivotal altitude
8. Downwind, fastest ground speed
   Steepest bank
   Closest distance to pylon
   Highest pivotal altitude
9. Cross midpoint of pylons wings level
   Repeat the figure 8 pattern
   Exit at point of entry a the same altitude and airspeed when maneuver started

Chandelle



1. Find appropriate area to perform maneuver
   a. Power – 2300 RPM
   b. Airspeed ≈ 105 KIAS
   c. Any altitude to allow maneuver to be completed at or above 1500 feet AGL
2. Roll into the wind with a 30^0 bank angle

   Pitch airplane up into a climbing turn

   Smoothly apply full power, without exceeding max RPM

   Once bank angle is established, neutralize ailerons

   Maintain coordination

3. Maintain 30^0 bank angle until 90^0 point

   Continue to increase pitch attitude until 90^0 point

   Maintain full power

   Altitude is increasing

   Airspeed is decreasing
4. Gradually start rolling out bank at 90^0 point

   Maintain pitch attitude

   Maintain coordination
5. Complete roll out to wings level at 180^0 point

   Airspeed is approximately 1.2 Vs1 +/- 5 kts (48x1.2= 57 kts)

   Momentarily hold airspeed

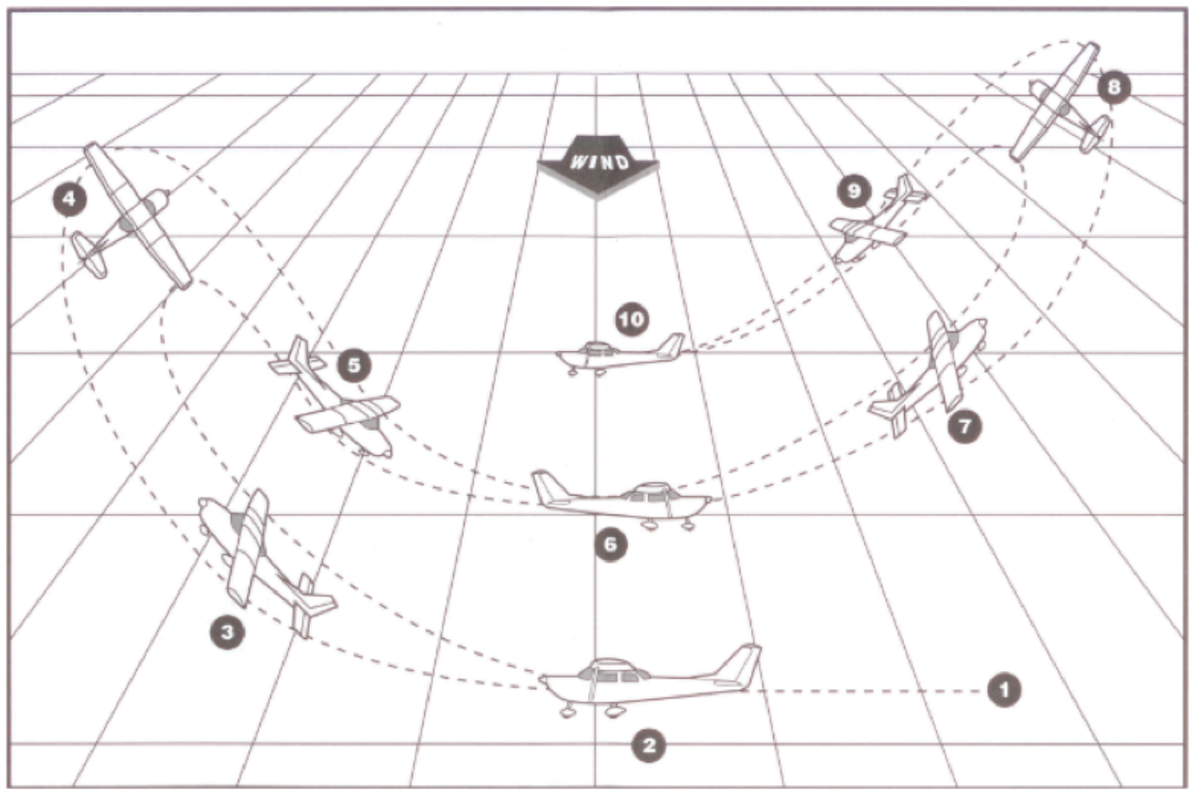
   Maintain coordination
6. Resume straight and level flight with minimum loss of altitude

   Let airspeed build

   Reduce power to cruise setting

   Repeat maneuver to the right

Lazy Eights



1. Find appropriate area to perform maneuver
   a. Power – 2300 RPM
   b. Airspeed ≈ 105 KIAS
   c. Any altitude to allow maneuver to be completed at or above 1500 feet AGL
2. Fly crosswind and select an upwind reference point abeam the wing tip
   Raise the nose above the horizon and begin a climb
   Slowly roll in bank, and enter a coordinated climbing turn into the wind
3. Pass the 45^0 reference point with maximum nose-up for maneuver
   Increase bank angle through 15^0
   Speed is decreasing
   Pitch attitude begins decreasing
   Bank angle continues to increase

4. Arrive at maximum bank angle 30^0 at the 90^0 reference point
   Pitch attitude is momentarily level
   Take note of minimum airspeed
   Take note of maximum altitude
   Pitch continues to decrease
   Bank decreases
   Speed increases
5. Pass the 135^0 reference point with the lowest nose attitude for the maneuver
   Reduce bank angle through 15^0
   Speed continues to increase
   Pitch begins increasing
   Bank angle continues to decrease
6. At the 180^0 reference point, aircraft is momentarily level
   Altitude is same as entry altitude
   Airspeed is same as entry airspeed
   Begin to raise the nose
   Gently roll bank in the opposite direction
7. Pass the 45^0 reference point with maximum nose-up for maneuver
   Increase the bank angle through 15^0
   Speed is decreasing
   Pitch attitude begins decreasing
   Bank angle continues to increase
8. Arrive at maximum bank angle of 30^0 at the 90^0 reference point
   Pitch attitude is momentarily level
   Take note of minimum airspeed
   Take note of maximum altitude
   Pitch continues to decrease
   Bank decreases
   Speed increases
9. Pass the 135^0 reference point with the lowest nose attitude for maneuver
   Reduce bank angle through 15^0
   Speed continues to increase
   Pitch begins increasing
   Bank angle continues to decrease
10. At the 180^0 reference point airplane is wings level
    Altitude is the same as entry altitude
    Airspeed is same as entry airspeed
    Resume straight and level flight

Appendix C

IFR Maneuvers

Appendix – C

IFR Maneuvers

BAIF Circuits

Circuit A

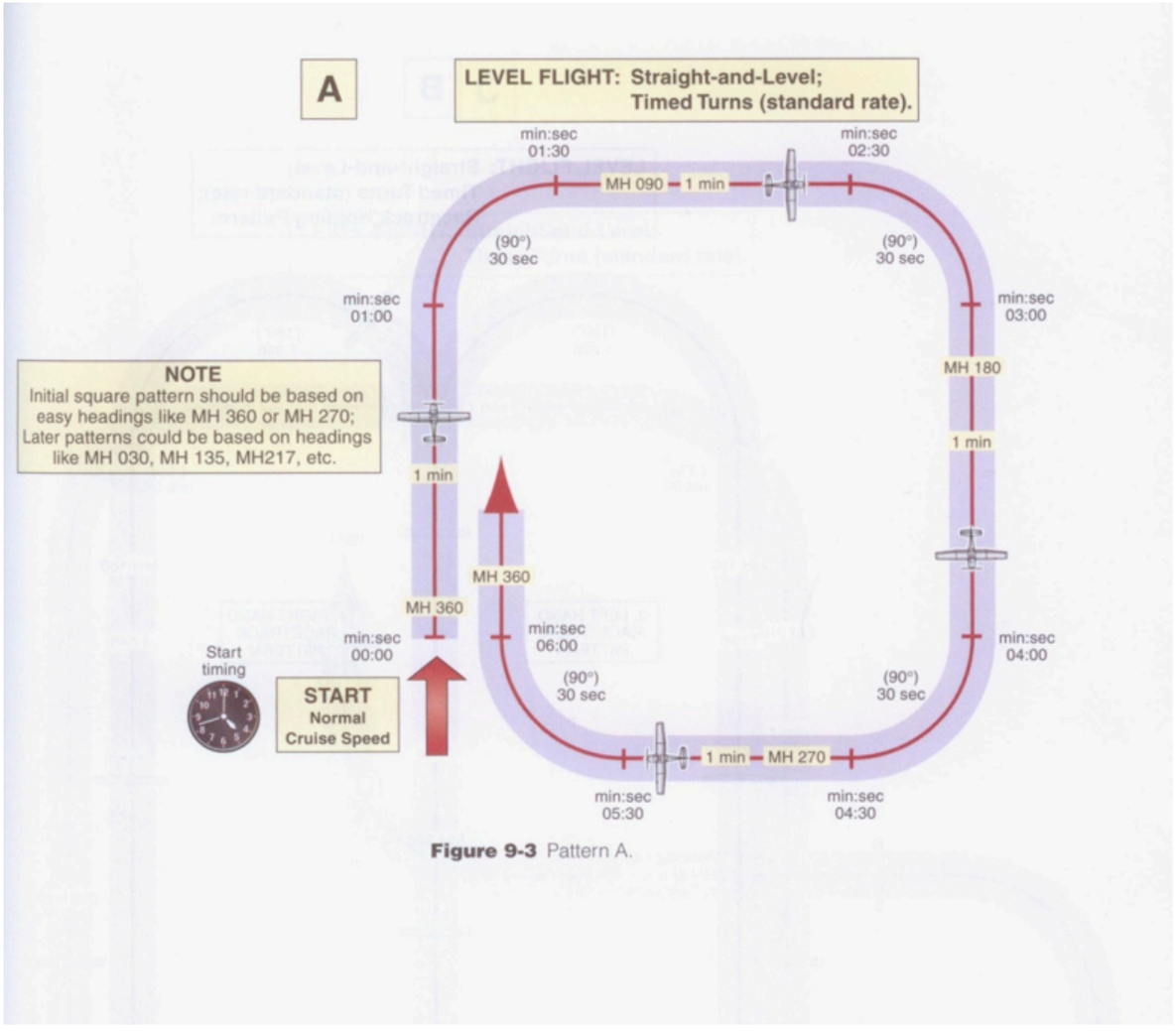


Figure 9-3 Pattern A.

Circuit B

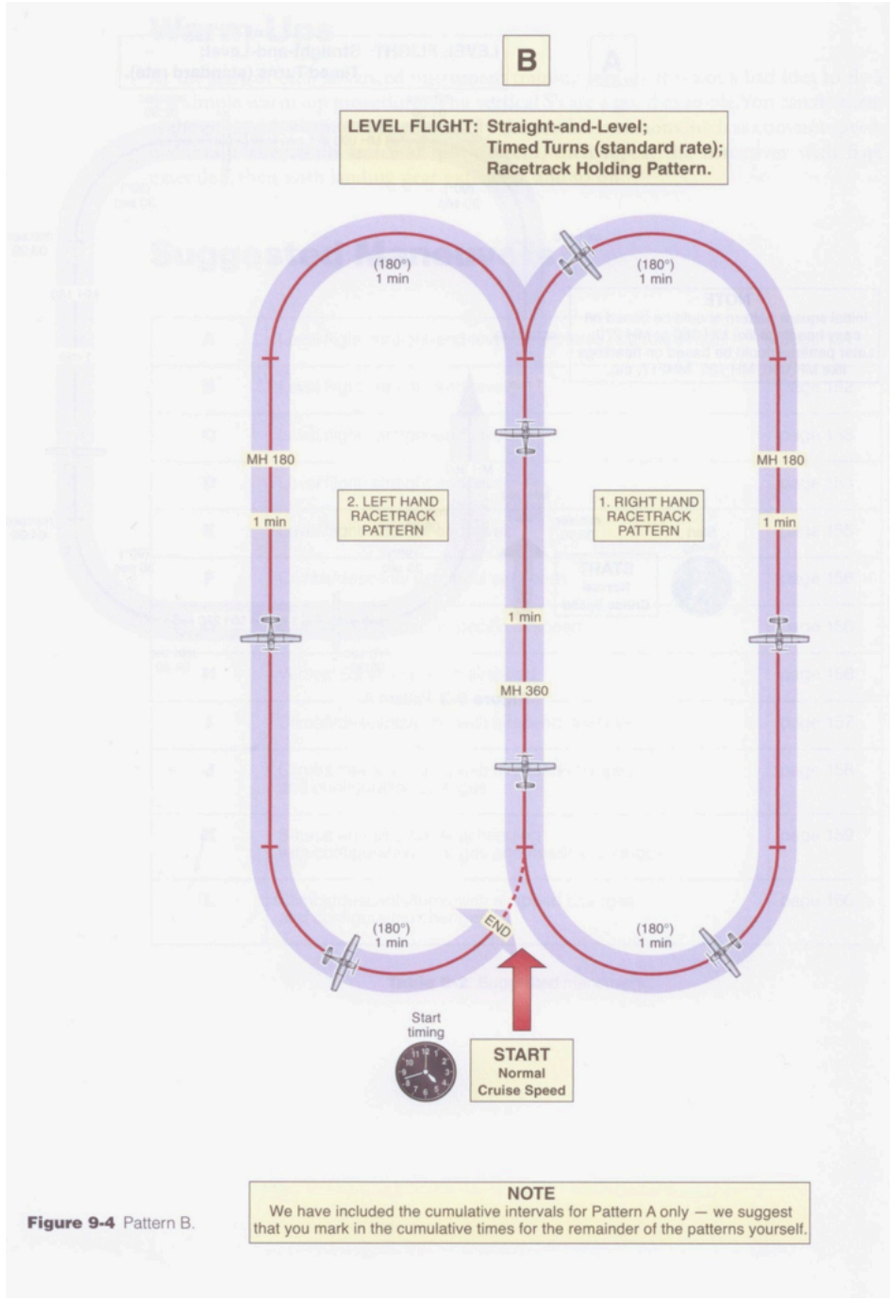


Figure 9-4 Pattern B.

NOTE
We have included the cumulative intervals for Pattern A only — we suggest that you mark in the cumulative times for the remainder of the patterns yourself.

Circuit C

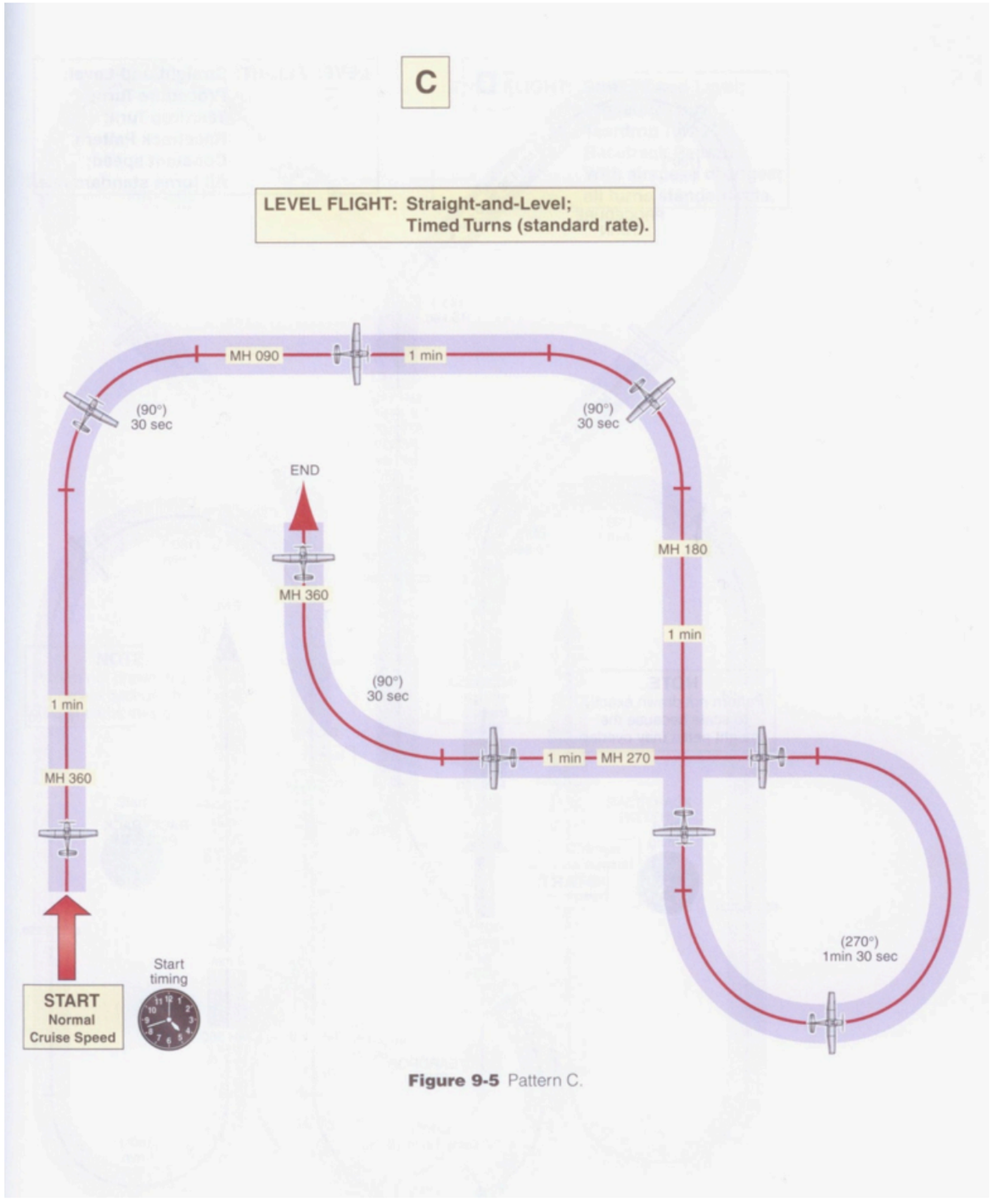


Figure 9-5 Pattern C.

Circuit D

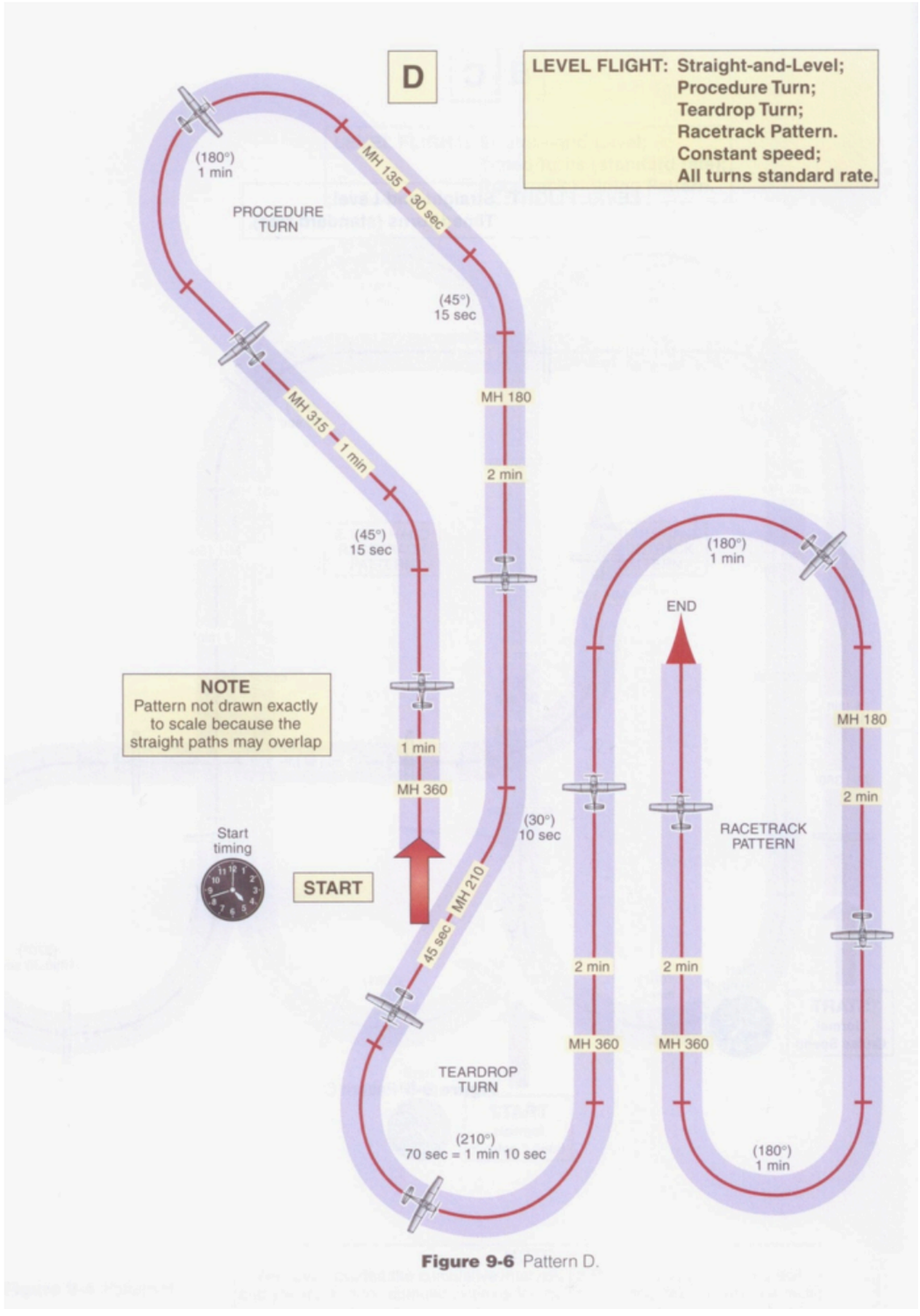


Figure 9-6 Pattern D.

Circuit E

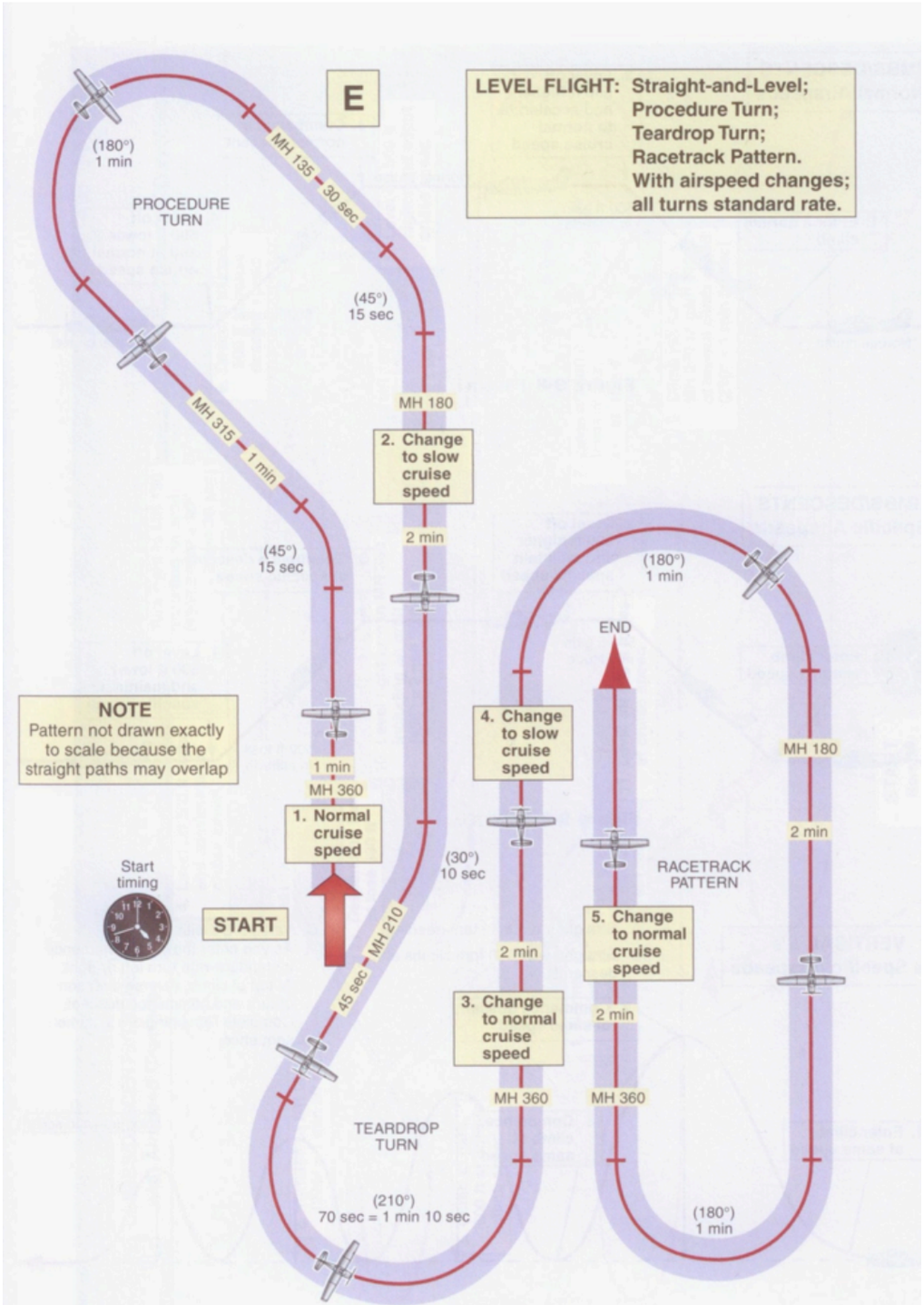


Figure 9-7 Pattern E.

Circuit F, G, & H

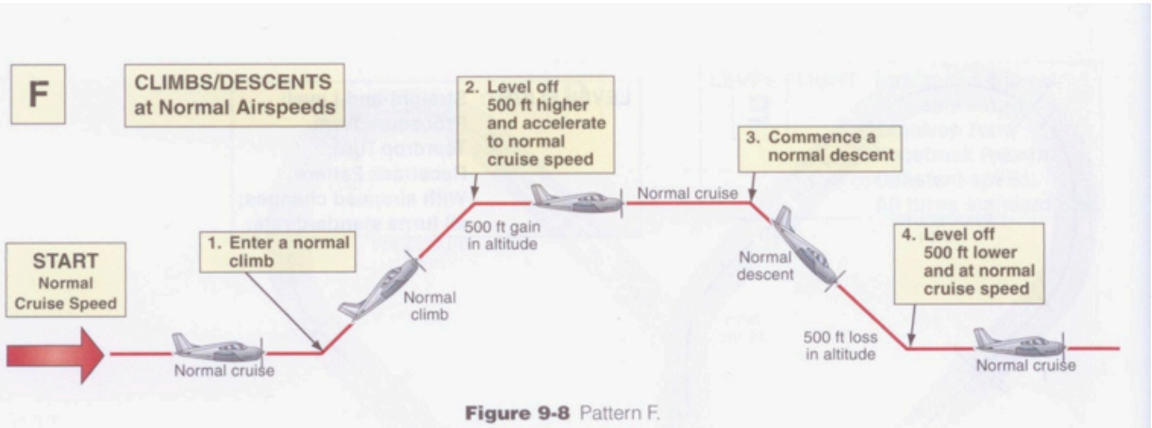


Figure 9-8 Pattern F.

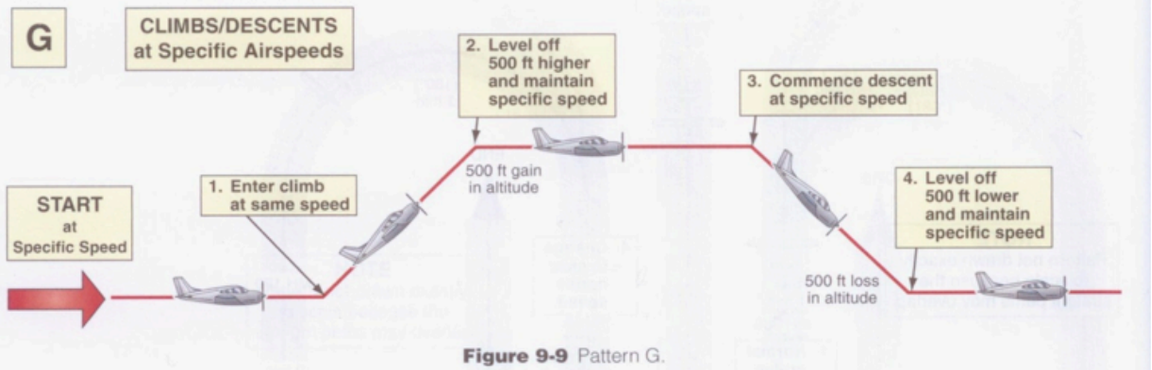


Figure 9-9 Pattern G.

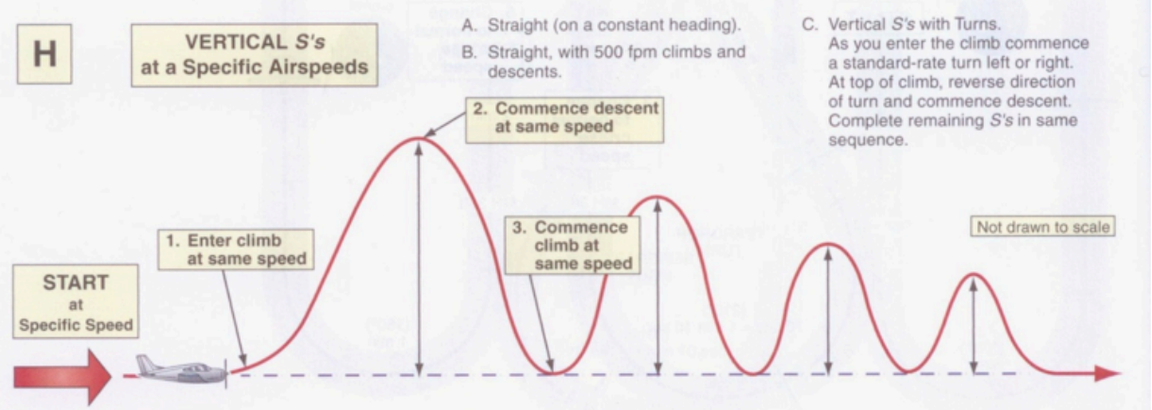


Figure 9-10 Pattern H.

Circuit I

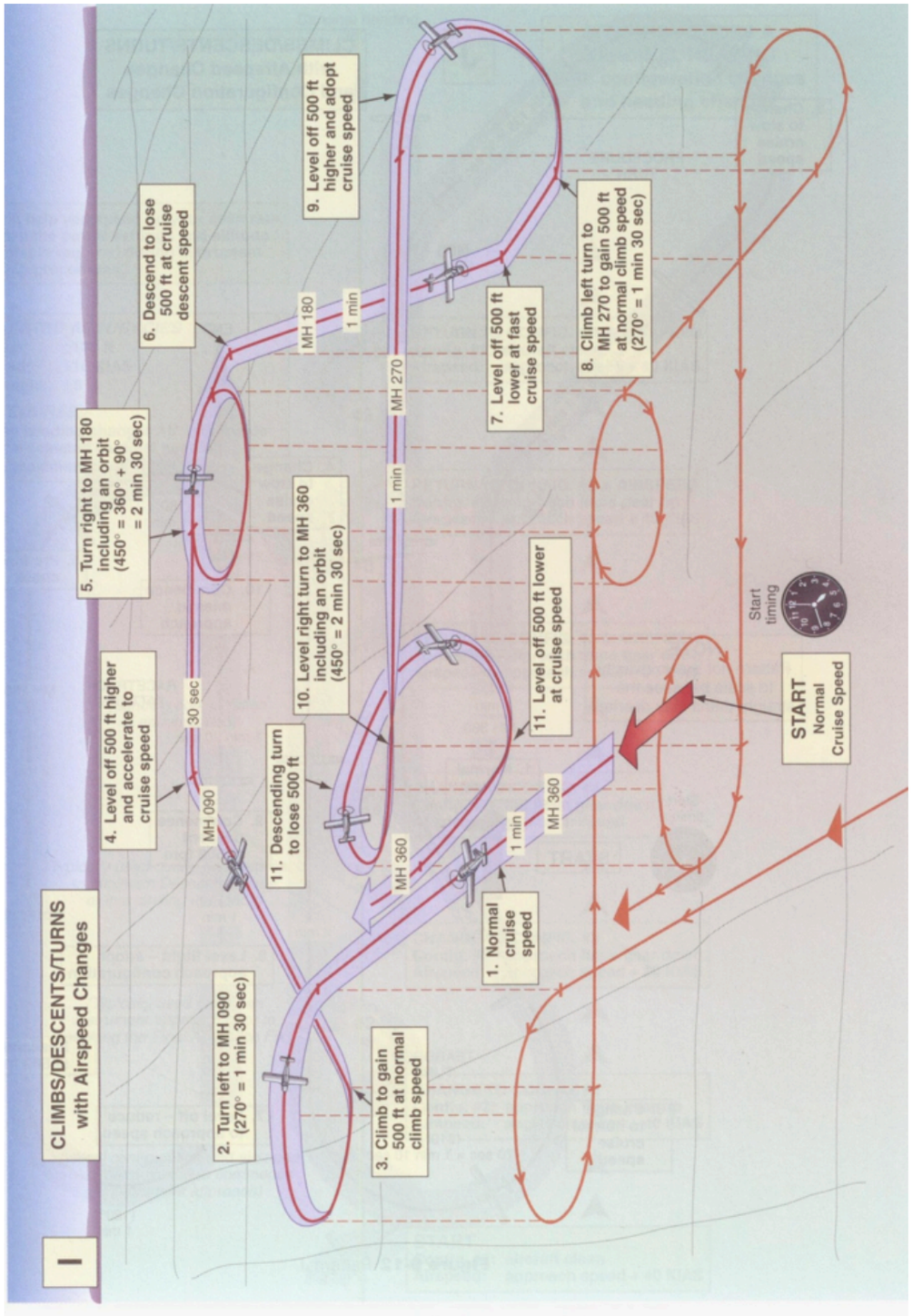


Figure 9-11 Pattern I.

Circuit J

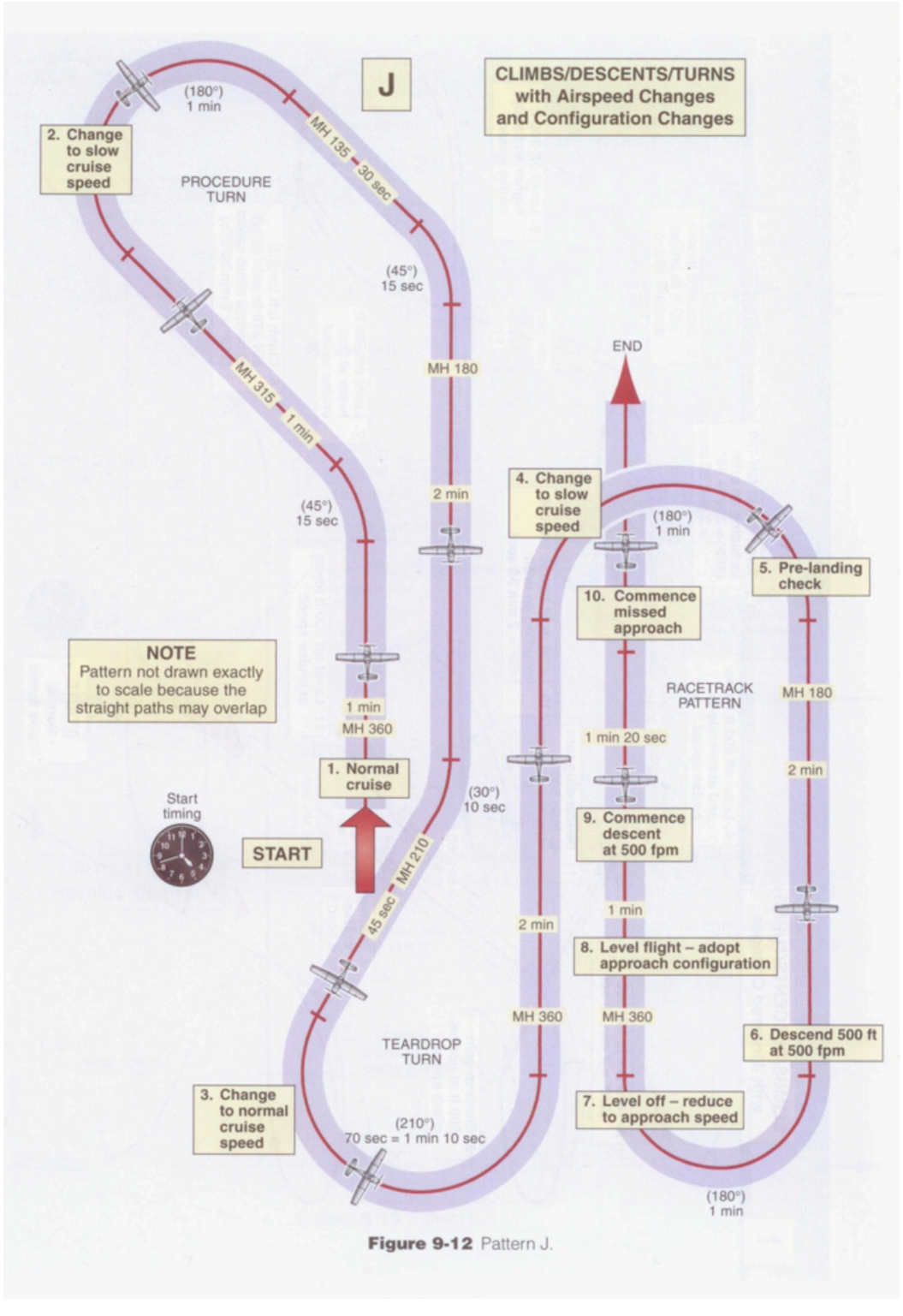


Figure 9-12 Pattern J.

Circuit K

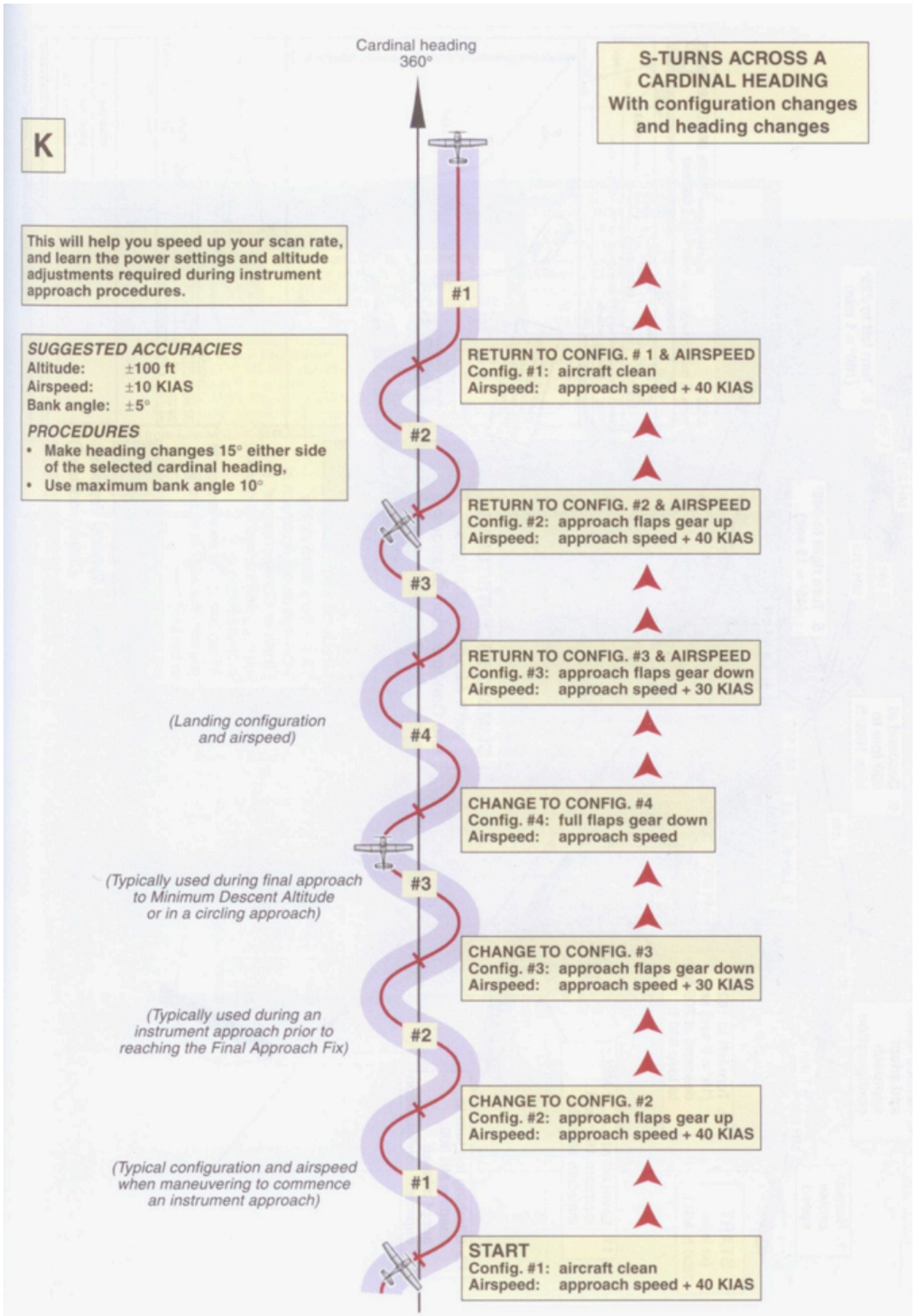


Figure 9-13 Pattern K.

Circuit L

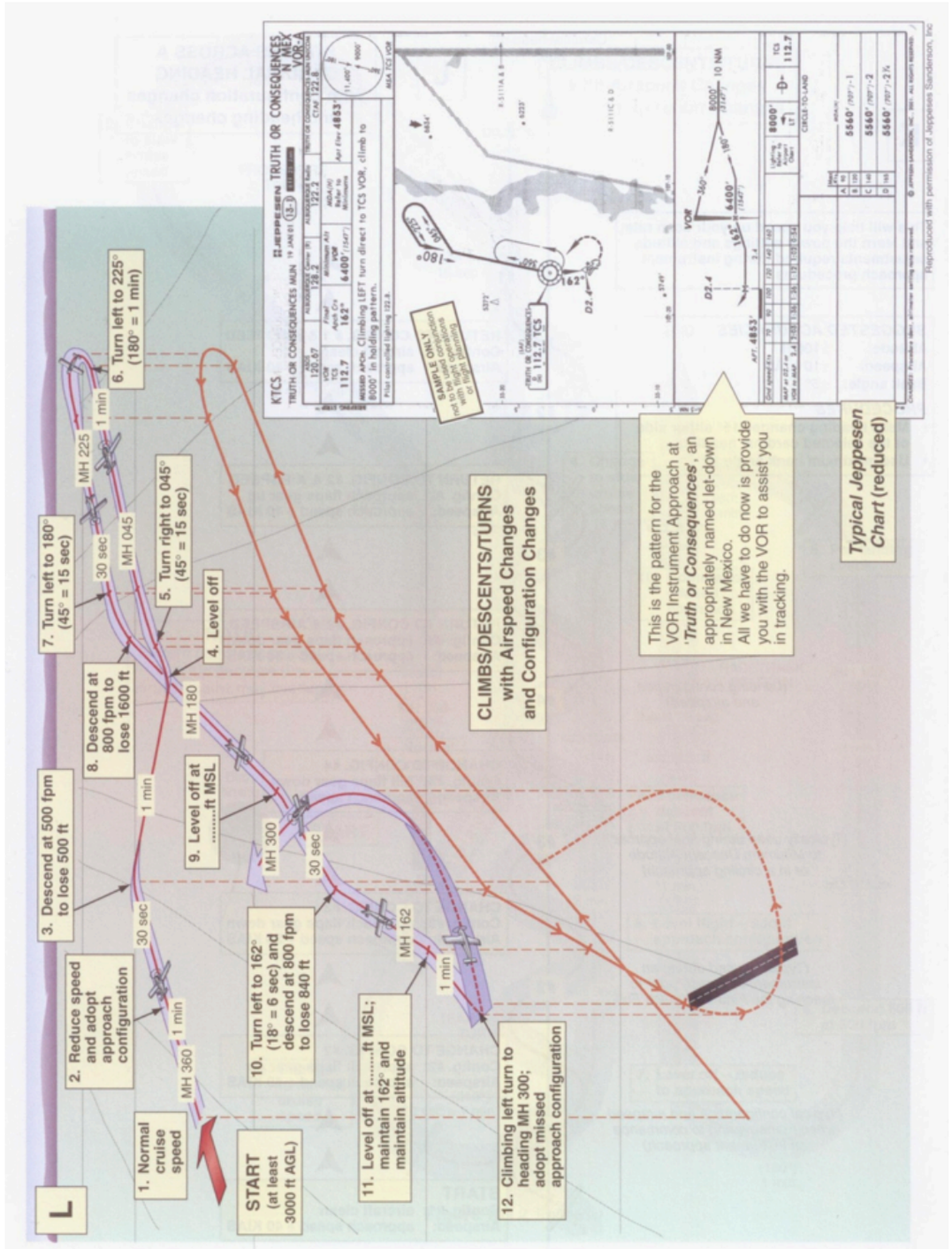


Figure 9-14 Pattern L.

ILS Circuit

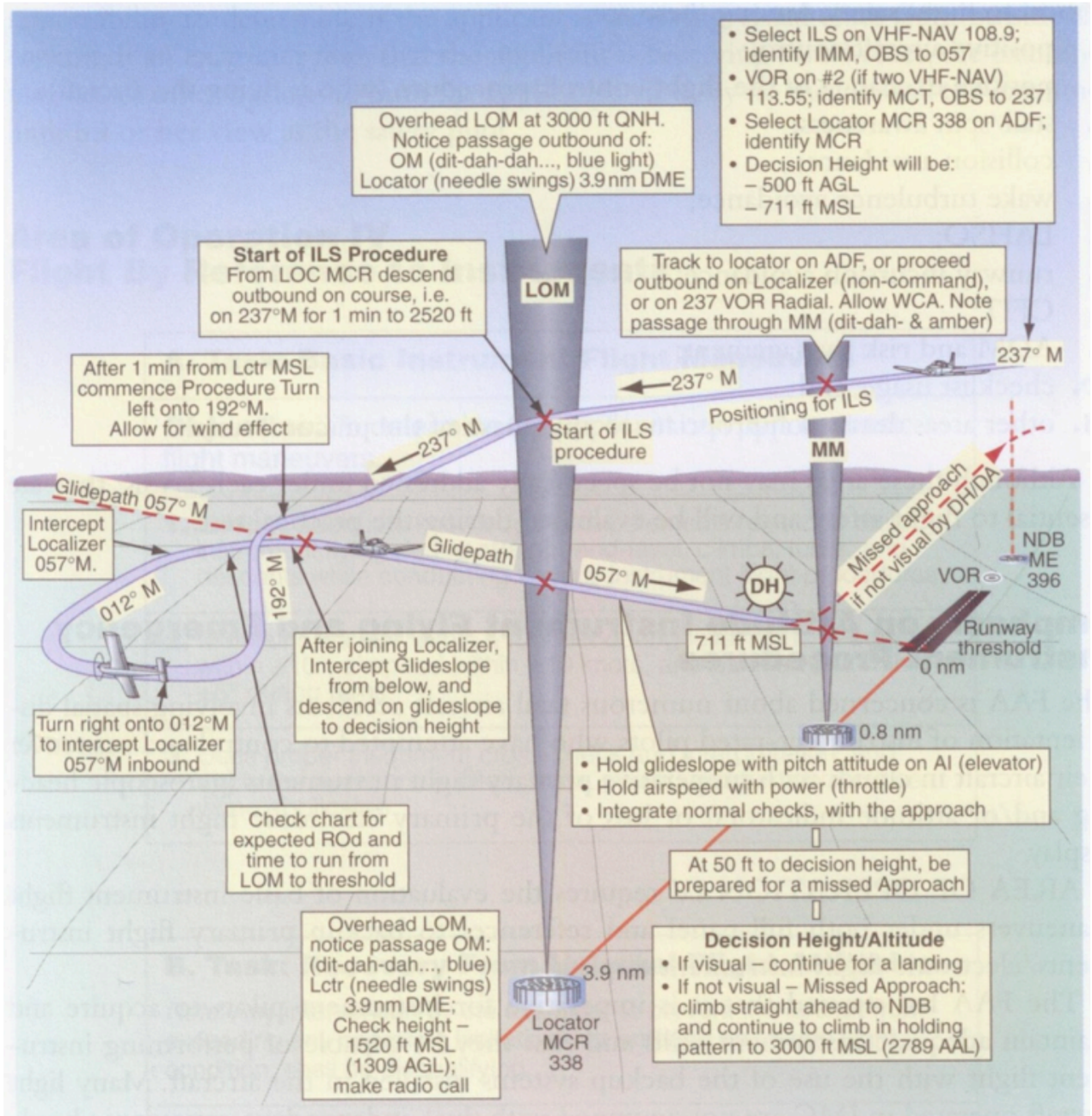


Figure 9-15 Typical maneuvering to conduct an ILS approach.

Unusual Attitudes

The industry definition of unusual attitudes are defined as pitch unintentionally exceeds 25 degrees nose up or 10 degrees nose down, bank angle unintentionally exceeds 45 degrees and airspeed and angle of attack are inappropriate for the condition.

In general, there are two types of unusual attitudes:

Nose High and Nose Low.

Nose High:

1. Airspeed Indicator – Airspeed will be decreasing rapidly
2. Altimeter – Altitude is increasing rapidly
3. Attitude Indicator – Miniature airplane above the horizon and usually banked.
4. Turn Coordinator – Greater than standard rate turn (Full deflection)
5. Heading Indicator – Depending on the bank of the aircraft, will be spinning rapidly.

Nose Low:

1. Airspeed Indicator – Airspeed will be increasing rapidly
2. Altimeter – Altitude will be decreasing rapidly
3. Attitude Indicator – Miniature airplane below the horizon and usually banked.
4. Turn Coordinator – Greater than standard rate turn (Full Deflection)
5. Heading Indicator – Depending on the bank of the aircraft, will be spinning rapidly.

The recovery procedure for unusual attitude is going to depend on which type of unusual attitude you are experiencing.

Recovery for a Nose High:

1. Reduce Pitch – Reducing the pitch will reduce the angle of attack almost immediately and will assist in increasing your airspeed.
2. Add Power – Adding power will assist in increasing your airspeed and helping to prevent a stall.
3. Level the Wings – Leveling the wings will help to prevent one wing stalling before another.

Note

It is imperative that you follow these steps in order. They are established in order of importance. While step one and step two should be done simultaneously, they are given in this order to establish the importance.

Recovery from a Nose Low:

1. Reduce Power – With a fixed pitch prop we do not want to over speed the prop. Also, we are attempting to reduce our overall airspeed.
2. Level the Wings – To prevent a graveyard spiral, it is imperative that you level the wings prior to pitching up.
3. Increase Pitch – Increase pitch of aircraft to bring it to a nose level attitude. At this point as the airspeed starts to bleed off, increase the power to prevent the aircraft from entering into a stall.

Note

It is imperative that you follow these steps in order. They are established in order of importance. If you attempt to increase pitch prior to leveling the wings you **WILL** enter a grave yard spiral.