

C172 TRAINING MANUEVERS STUDY NOTES

Revision 09-2010

CRUISE

Choose a point off center of cowling on horizon. Maintain point in a fixed position and fly to it.

Established:

Pitch for altitude
Power for airspeed

Not Established:

Pitch for airspeed
Power for altitude
Retrim

Example:

On altitude, on speed
100 foot variations

Example:

Several hundred feet off, full power
climb needed

Scan:

Wingtip to wingtip when in straight and level flight.

“Outside, Outside, Outside, Outside, Airspeed, Altitude Outside,
Outside, Outside”

Scan straight ahead once turning.

Every couple sweeps recheck “Airspeed, Heading, Attitude, Altitude.

Every couple minutes check engine instruments, and potential off site
emergency fields

CLEARING TURNS

Description: A left 90 degree course change followed by a right 90 degree course
change.

Purpose: To look for traffic

Method: Before a maneuver

30 degree bank, turn 90 degrees left, then 90 back

Between maneuvers

30 degree bank 360, 180, 90 degree left or right turn

Scan: Wing tip to wing tip sweep “Outside, Outside, Outside, Outside, Airspeed, Heading, Altitude”

SLOWFIGHT (MCA)

Description: Slow the plane down to the bottom of the white arc or green arc by reducing power, bleeding off speed, and increasing AOA. Then altitude and airspeed are held constant, while making shallow turns

Purpose: To control an airplane at the lower end of the flight regime just above stall speed and to positively transfer this understanding to short final and round out of an airplane during approach to landing.

Altitude: At or above 1500 AGL

Preparation: Clearing turn.

Premanuever check: Mix Set, Carb Heat On, Fuel Pump On, Tank Selected, Mags Both

SET UP MCA in LANDING CONFIGURATION

Decelerate: Power 2000RPM
Carb On
Trim Up
Below 110kts, set 1st flaps
Below 85 kts, set 2nd flaps(20 degrees)
Pitch to hold altitude as configure
Power 1500 RPM
Set 3rd flaps (30 degrees)
Retrim for low speed

Stabilize: Power to 2000 RPM to hold altitude
Pitch for 45 to 50 kts.

Call start altitude, heading, and airspeed

SET UP MCA in CLEAN CONFIGURATION

Decelerate: Power 2000 RPM
Carb On
Trim up

Stabilize: Power to 2000 to hold altitude
Pitch for 60 kts.
Call start altitude, heading, and airspeed

Established:

Pitch for airspeed

Power for altitude

Example:

During approach,

On glide path, on speed

Not Established:

Pitch for altitude

Power for airspeed

Example:

Initiating a descent

Bank: At standard rate on turn coordinator.

The steeper the bank, the harder to control the plane at low speeds.

To go left, relax right rudder, and apply light left aileron.

To go right, increase right rudder, and apply light right aileron.

Scan: Wingtip to wingtip when straight, straight ahead once turning. "Outside, Outside, Outside, Outside, Airspeed, Altitude"

Every three or four scans. " Outside, Outside, Outside, Airspeed, Wings, Heading, Altitude"

45 DEGREE BANK TURNS

Description: The pilot flies a steep left 360 followed by a right steep 360 level turn.

Purpose: Gives pilots exposure to control feel at different end of flight regime from MCA. Increases pilot control ability. Prepares for need to make sudden, or evasive steep turn due oncoming traffic, objects, nearby clouds. Positive transfer of ability to thirty degree bank turns in traffic pattern.

Preparation: At or above 1500 AGL

Clearing turn

Pre-maneuver check: Mix Set, Carb Heat On, Fuel Pump On, Tank Selected, Mags Both

Call start altitude, heading, and airspeed

Entry: Lead turn with light foot pressure and follow near simultaneously with aileron pressure.

Roll into bank placing miniature plane on attitude indicator horizon and setting bank to 45 degrees.

Trim up slightly as add each 15 degrees of bank. Aircraft should be able to fly nearly hands off or hands off in smooth air.

Look up outside, & memorize picture of angle between horizon and dash board.

Slightly increase power if airspeed bleeds off and or altitude loss occurs. (Both occur as bank increases because of increased wing loading and decrease in vertical lift.)

Execution: Maintain intersection between dash and horizon constant.
If horizon goes down, you're going up.
If horizon goes up, you're going down.

If loose altitude too quickly, slightly reduce bank angle temporarily, trim back and steepen up again.

Exit: 10 degrees prior to roll out heading lead roll out with light foot pressure and top wing aileron pressure.

Rudder: More foot pressure applied in right turn roll in and left turn roll out.

Scan: Straight ahead once turning.
"Outside, Outside, Outside, Outside, Airspeed, Attitude, Altitude"

Every few sweeps recheck "Airspeed, Heading, Attitude, Altitude."

POWER OFF STALLS

Description: Slow airplane down and increase AOA simultaneously until airplane begins to mush. Announce incipient stall. Slow further until airplane exceeds critical angle, stalls and sinks, then smoothly recover by lowering nose and angle of attack, and increasing to maximum power. Flaps are incrementally retracted and the airplane is flown back to and retrimmed for cruise.

Purpose: To develop pilot control ability to exit and re-enter the lower end of the flight regime while maintaining coordination. To develop pilot ability to recognize and prevent potentially life threatening accidents due to loss of lift. This maneuver simulates a stall during final approach and is also called an "arrival stall" There is a positive transfer of knowledge to the action of flaring an airplane for landing.

Preparation: At or above 1500 AGL
Clearing turn
Premanuever check: Mix Set Carb Heat On, Fuel Pump On,
Tank Selected, Mags Both
Call start altitude, heading, and airspeed

Level off & accelerate to cruise speed, then power 2400

Scan: Wing tip to wing tip sweep during deceleration.
“Outside, Outside, Outside, Outside, Airspeed, Altitude”
Straight ahead during stall flare.
“Outside, Outside, Outside, Outside, Speed, Wings (Inclinometer),
Ball, Heading”
Straight ahead during recovery.
“Outside, Outside, Outside, Speed, Wings, Ball, Heading.”

TURNING STALLS

As above. Maintain standard rate turn in the stall entry.

POWER ON STALLS

Description: Slow to rotation speed with power back and take off flaps. Add full power and assume a very steep climb until speed bleeds off and critical angle is exceeded. As plane mushes, announce the incipient stall. At the full stall, announce as such, and lower the nose to the horizon

Purpose: To avoid accidental loss of control during an excessively steep initial climb attitude that might lead to a serious accident. To develop pilot ability to stay coordinated through different airspeeds.

Preparation: At or above 1500 AGL
Clearing turn
Premanuever check: Mix rich, Carb Heat On, Fuel Pump On, Tank
Selected, Mags Both
Call start altitude, heading, and airspeed

Decelerate: 2000 RPM
Carb On
Trim up
Slow to VR 65-70kts

Entry: At 65-70 kts:

Mix, Throttle Full Up, Coordinate with Right Rudder
Carb Off

Pitch smoothly up 10 to 15 degrees until obtain stall break

Exit: Recover, Go Around, & Level off at start altitude
Nose smooth down a couple inches below the horizon.

Level off & accelerate to cruise speed, then power 2400 RPM

Scan: Wing tip to wing tip sweep during deceleration.
“Outside, Outside, Outside, Outside, Airspeed, Altitude”
Straight ahead during stall flare and climb out.
“Outside, Outside, Outside, Outside, Speed, Wings (Inclinometer),
Ball, Heading”
Straight ahead during recovery.
“Outside, Outside, Outside, Speed, Wings, Ball, Heading.”

TURNING STALLS

As above. Maintain standard rate turn in the stall entry.

SIMULATED ENGINE OUTS (End all simulations at 500AGL and go around)

Description: Instructor reduces the power smoothly to idle, and the candidate, selects a suitable emergency landing site, trims for best glide speed and pilots the plane toward the field. In the meantime the candidate attempts to simulated restart the airplane, simulated radio for help, and simulated secure the plane for forced landing.

Purpose: To effectively handle emergency engine trouble.

SIMULATED SUDDEN ENROUTE FAILURE

Plan: Best Speed - Gradually Trim for 65 kts
Best Field - Choose and consider length, proximity, terrain, slope, winds
Best Positioning - Confirm Strategy. (Downwind, Base, Final, Spiral to downwind)

Troubleshoot: Fuel Selector on Both
Mixture adjust
Carburator Heat ON
Mags – Left/Right/Both/Start

Radio: 121.5 & Transponder 7700
“May Day, May Day, Cessna 92704, two people on blue on white airplane, lost engine over Carrol County airport, landing Carrol County”

Secure: Tank – OFF
Mix - OFF
Mags - OFF
Doors - Ajar
Passengers – Seats back, glasses off, brace position

Glide: 65 knots. Flaps down as needed. Main OFF

SIMULATED GRADUAL ENROUTE FAILURE

Troubleshoot: Fuel Selector Both
Mixture adjust
Carburator Heat ON
Mags – Left/Right/Both/Start

Plan: Best Speed - Gradually Trim for 65 kts
Best Field - Choose and consider length, proximity, terrain, slope, winds
Best Positioning - Confirm Strategy. (Downwind, Base, Final, Spiral to downwind)

Radio: 121.5 & Transponder 7700
“May Day, May Day, Cessna 92704, two people on silver on blue airplane, loosing engine power over Carrol County airport, landing Carrol County”

Approach: Stay higher, tighter, and clean, 85 kts until runway is assured.

SIMULATED SUDDEN FAILURE IN PATTERN

Assuming no better emergency landing sites in sight:

Glide: 65 kts until runway assured!

Midfield Downwind
Gradual arcing base and final
Extended Downwind
Prompt turn back to runway
Base
Turn to runway

In all cases, keep flaps retracted until seconds away from an obstacle or the runway, unless runway is assured. Deployment gives very temporary balloon effect.

SHORT AND SOFT FIELD TAKE OFF'S AND LANDINGS

Purpose: To safely operate from short and unimproved runways.

Short field approaches are higher drag, powered approaches, that begin as gliding, decelerating finals, and finish as established powered short finals that are slightly slower and slightly steeper. In contrast normal approaches typically begin as powered finals with gliding short finals.

SHORT FIELD APPROACH

Downwind past approach end runway numbers:

Reduce power to 2000 and place first flaps.

Ready to turn base, reduce to 1500 and set second flaps.

Hold altitude, or descend very gradually on base to capture 70 kts.

Reduce power in base to final turn as begin descent and capture 65 kts.

By mid-final aircraft feels slightly less stable at 65 than usual feel at 70.

Support profile trajectory with increased power.

Trim to capture 65 kts.

Pitch manually to maintain 65kts.

Approaching round out reduce power further without reaching full idle.

Round out from tree tops will induce controlled sink rate due high drag configuration.

Entering flare, walk power to idle.

Touching down:

Announce "Max Brakes"

Maintain full elevator back pressure during roll out for aerodynamic braking.

SOFT FIELD LANDING

Use short field approach procedure.

Once established in flare add slight power increase (50RPM) by sound, not sight, moments before touch down.

Keep power until a couple seconds after touchdown, then bring power to idle.

Maintain full elevator back pressure in roll out and taxi.

Taxi with minimum braking.

SHORT FIELD TAKEOFF

Back taxi all available runway

Hold brakes as apply full power

Confirm Greens

Brake release

Rotate @ 60

Climb out at 65 kts with take off flaps until clear obstacles.

SOFT FIELD TAKE OFF

Full elevator back pressure.

Jogging roll on to runway centerline.

Smoothly apply full power.

Slightly Relax back pressure after nose wheel elevates to maintain visibility of runway.

Relax further back pressure as main wheels come off ground.

Hold plane level, one half wingspan off runway until attain 70 kts.

Rotate and climb out at normal or short field departure speeds.

SPECIAL NAVIGATION TASKS

Purpose: To insure pilot ability to navigate without getting lost, and to insure ability to require knowledge of position if temporarily unsure.

LOST PROCEDURES (NO GPS, NO VOR)

Choose visible point below and use as orbit station.

Look outside for most visible land marks then search for them on map.

Climb to higher altitude if good visibility, descend if bad visibility.

Contact Flight Watch, ATC, or 121.5 as needed if still uncertain of position.

TRIANGULATION

Establish level orbit.

Choose two navaids believed to be closest.

Program frequencies and ident.

Center CDIs with FROMs by rotating OBS

DIVERSION

Choose visible point below and circle overhead while complete planning

Draw course line to diversion point

Determine mag heading to point

Measure distance to point

Determine average ground speed to point given winds aloft

Determine wind correction angle

Leave orbit station and begin timing

WIND REFERENCE MANUEVERS

Purpose: To develop pilot ability to compensate for wind drift while dividing attention between aircraft control and traffic detection and avoidance.

TURN ON A POINT

Descend to 1000 AGL

Complete clearing turn and premaneuver check

Select point...

away from persons, structures, and livestock

with offsite emergency field close by

Call start heading, altitude, and airspeed.

Enter orbit to left side

Complete two left level 360 degree turns.

Vary bank angle to maintain constant radius around point

Place steepest bank when downwind.

Place medium bank when crosswind.

Wingtip will lead point crosswind to downwind due correction angle

Wingtip will lag point downwind to crosswind due correction angle

Place shallowest bank when upwind.

Exit at completion of second orbit

S TURNS ON A ROAD

Descend to 1000 AGL

Complete clearing turn & premaneuver check

Select road perpendicular to wind.

Position plane into, or with wind and cross perpendicular to road.

Select point $\frac{1}{4}$ to $\frac{1}{2}$ mile off left wing.

Call start heading, altitude and airspeed.

Complete a constant radius 180 turn around point

Vary bank angle to maintain constant radius around point

Place steepest bank when downwind.

Place medium bank when crosswind.

Wingtip will lead point crosswind to downwind due correction angle

Wingtip will lag point downwind to crosswind due correction angle

Place shallowest bank when upwind.

Select point $\frac{1}{4}$ to $\frac{1}{2}$ mile off right wing and repeat procedure.

Exit as return perpendicular over road.