Utah State University
AVIATION TECHNOLOGY

SOP
Quick Reference Guide

Private and Commercial QRG

Ground Reference Maneuvers

Turns Around a Point, Rectangular Course, S-Turns, and Eights on Pylons

DA40F

Altitude	800'AGL
Power	~ 2350 RPM
Airspeed	95 KIAS
Pitch	+4°
Flaps	UP
Fuel Pump	ON

Arrow PA28R-200

Altitude	800'AGL
Power	~ 17" MP, 2550 RPM
Airspeed	100 MPH
Pitch	+2°
Flaps	UP
Fuel Pump	ON

Pivotal Altitude Calculations

The formula is as follows: ground speed squared divided by 11.3 for knots and ground speed squared divided by 15 for miles per hour.

Remember these are figured in Groundspeed and rounded up.

KTS	MPH	ALT AGL
87	100	670
91	105	735
96	110	810
104	120	960
109	125	1050
113	130	1130

Performance Manuevers

Minimum Altitude +2000'AGL

Steep Turns

DA40F	95KIAS
PA28R-200	100 MPH

Chandelles

DA40F	**VA**
Below 2161 lbs.	94 KIAS
Upto 2535 lbs.	108 KIAS
PA28R-200	<131 MPH

Lazy Eights

DA40F	
Below 2161 lbs.	84 KIAS
Upto 2535 lbs.	95 KIAS
PA28R-200	110 MPH

Steep Spiral

DA40F Vg	73 KIAS
PA28R-200 Vg	95-105 MPH

Stalls & Slow Flight

Minimum Altitude	+2000'AGL

Slow Flight

DA40F	2200 RPM
Below 2161 lbs.	45-47 KIAS
Upto 2535 lbs.	52-54 KIAS
PA28R-200	19" MP 2700 RPM
Bottom of White Arc	55-63 MPH

Power On Stalls

DA40F	65 KIAS Takeoff Config.
	73 KIAS Cruise Climb Config.
PA28R-200	75 MPH Takeoff Config.
	100-110 MPH Cruise Climb Config.

Power Off Stalls

DA40F	75 KIAS Landing Config.
PA28R-200	75 MPH Landing Config.
Gear and Flaps Extended	

Instrument QRG

Pitch/Power Table (DA40)

Phase	Airspeed	Config	RPM	Pitch
Initial Climb <1000 AGL	** See Chart	Flaps T/O, Carb heat cold	Full - 2600	+8
Cruise Climb >1000 AGL	** See Chart	Flaps UP, Carb heat cold	Full - 2600	+7
Normal Cruise	110	Clean, Carb heat cold	2500	-1
Holding, Transition	100	Clean, Carb heat cold	2400	+1
Cruise Descent (smooth air only)	130	Clean, Carb heat ON	2500	-8
Normal Descent	120	Clean, Carb heat ON	2350	-2
Vectors (within 90° of inbound course)	90	Clean, Carb heat cold	2300	+2
V_{tgt}	*Calculated	Flaps T/O, Carb heat ON	2000	-4
Standard V_{ref}	85	Flaps T/O, Carb heat cold	1950	-4
Final Approach Landing Assured	** See Chart	**See Chart, Carb Heat Cold	1500	-3

*V_{tgt} = V_{ref} + 5 + 1/2 the steady state wind + gust factor (never to exceed V_{ref} + 25)

**Chart

Airspeeds	1874 lbs	2205 lbs	2535 lbs
Initial Climb	54 KIAS	60 KIAS	66 KIAS
Cruise Climb	60 KIAS	68 KIAS	73 KIAS
Approach in Cruise settings (Flaps UP or T/O)	60 KIAS	68 KIAS	73 KIAS
Approach for normal landing (Flaps LDG)	58 KIAS	63 KIAS	71 KIAS

Turns

Standard Rate Turn

Standard Rate Turn	3° per second
Bank Estimate	(TAS/10) +6 or 15% TAS

Timed Turns

A standard-rate turn of 3° per second equates to 10 seconds required to turn 30°. To execute a timed turn:

Timer	Start
Bank	Establish Standard Rate
Estimate/calculate	Time for turn
Time limit	Roll out

Roll-out Lead

Bank Angle	Lead
Up to 15°	5°
15°-30°	10°
Above 30°	15°

Magnetic Compass

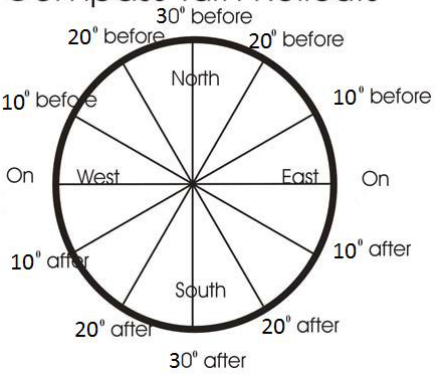
Compass Errors

Magnetic Dip

UNOS - Undershoot North, Overshoot South

- Roll wings level prior to a desired northerly heading and after a desired southerly heading.
- The amount of lead or lag when turning directly north or south varies with and is a function of the current local latitude (e.g., 42° at KLGU). The undershoot or overshoot diminishes incrementally to zero at direct easterly and westerly headings.

Compass Turn Rollouts



Degrees of lead = function of current latitude + normal lead

Where:

Function of Current Latitude =

(100- current latitude (##°)% * current latitude)+

Normal Lead = based on bank angle (see "Roll-out Lead")

E.X. for KLGU

Function of Current Latitude

((100-42) = 58%) *42° = 24.36

Normal Lead = + 5°

lead = ~29°

Acceleration Compass Errors

ANDS Accelerate North, Decelerate South

- The magnetic compass will indicate a temporary turn to the north anytime an aircraft is accelerated abruptly on a direct easterly or westerly heading and it will indicate a temporary turn to the south anytime an aircraft is decelerated abruptly on a direct easterly or westerly heading.

Compass Deviation - caused by an aircraft's structure and the electrical accessories in the aircraft. See deviation card on the magnetic compass in each specific aircraft.

Magnetic Variation - Difference between true north and magnetic north. This varies according to location around the earth.

Instrument Bugs

Altimeter Bug - should always be set on assigned altitude or a target altitude for climb or descent.

Heading Bug - should always be set on assigned heading, course intercept heading, heading required to maintain course, runway heading for takeoff, or outbound heading for holds.

Airspeed

Increase Airspeed

Power	Increase to Target
Pitch	Nose Down to Target
Trim	Re-trim to Airspeed

Decrease Airspeed

Power	Decrease to Target
Pitch	Nose Up to Target
Trim	Re-trim to Airspeed

Climbs/Descents

Call-outs

"1,000 FEET TO GO"

(1,000 FEET BELOW A HIGHER TARGET ALTITUDE OR 1,000 FEET ABOVE A LOWER TARGET ALTITUDE)

"200 FEET TO GO"

(200 feet below a higher target altitude and 200 feet above a lower target altitude)

- These call-outs apply anytime an altitude change is made; this includes descending to the minimums on instrument approach procedures. Level-off from climbs and descents should be started at 10% of the VSI indication.

Glide Slope

Rate of descent is controlled by pitch!

When high on the glide slope, pitch down.

When low on the glide slope, pitch up.

Airspeed is controlled by power!

When airspeed is slow, increase power.

When airspeed is high, decrease power.

Unusual Attitude Recovery

Nose-Low Recovery

Power Bank Pitch (increasing airspeed)

Throttle	Idle
Wings	*Level
Elevator	Pull to the Horizon

- * In a nose-low recovery level the wings before pulling the nose up. This will avoid increased load factors imposed on the aircraft structure by the bank angle of the aircraft. The intent of this is to avoid structural damage which may occur to the aircraft during a poorly executed, nose-low unusual attitude recovery.

Nose-High Recovery

Power Pitch Bank (decreasing airspeed)

Throttle	Full
Wings	Push to Horizon
Elevator	Level

Holds

Hold Setup

Nav Source	Set/Identified
Entry	Determine
Airspeed	100 KIAS
RPM	2350
GPS (if using)	SUSP prior to Fix
Timer	Start at Fix
Cruise Checklist	Perform

Direction of Turns

Standard - right turns (used unless specified of depicted otherwise)

Non-standard – left turns (only used when depicted or specified)

Direct

Initial turn will be in the same direction as the turns of the assigned hold.

Crossing Fix	Turn to outbound heading
Timer	Start at Wings Level
Turn inbound	At Desired Time
Inbound Course	Intercept

Teardrop

Initial turn will be in the same direction as the turns of the assigned hold.

Crossing Fix	Turn to heading +/-30° of inbound course
Timer	Start
Turn inbound	At Desired Time
Inbound Course	Intercept

Parallel

Initial two turns will be in the opposite direction as the turns of the assigned hold.

Crossing Fix	Turn to heading opposite of inbound course
Timer	Start
Turn inbound	*At Desired Time

*

- a. For VOR stations and GPS waypoints- fly direct back to the holding fix. Continue normal hold procedures.
- b. For Localizer or Intersection Holds- turn to an intercept heading for the inbound course. When the course needle comes alive, intercept and track the inbound course to the fix. Continue normal hold procedures.

Hold Timing/Distance

Regardless of whether you have completed the outbound turn or not, start the outbound timer upon crossing the perpendicular course. There are a few ways to identify the perpendicular course:

1. Set the HSI to the perpendicular course and wait until the needle centers
2. Wait for the RMI needle to indicate the perpendicular course
3. When the DME reads the same as the holding fix DME. (This method does not identify the perpendicular course exactly, but it is close enough.)

Standard timing – 3 minutes from the perpendicular course outbound, around the holding pattern, and back inbound to the fix. This allows for no-wind leg times of 1 minute and a total hold pattern time of 4 minutes.

Extended timing – 4 minutes from the perpendicular course outbound, around the holding pattern, and back inbound to the fix. This allows for no-wind leg times of 1minute and 30 seconds and a total hold pattern time of 5 minutes.

Distance patterns – Legs can also be assigned by distance (i.e. 10 mile legs). The along-track distance readout from the holding fix on the G1000 can be used to identify leg distances. Simply turn to the inbound course upon reaching the outbound leg distance.

Wind Correction for Holds

Timing correction – adjust the outbound leg by ½ of the timing discrepancy. (I.e. If the holding pattern time was 30 seconds late, reduce the outbound time by 15 seconds. If the holding pattern time was 20 seconds early, extend the outbound time by 10 seconds.)

Crosswind correction – triple the inbound wind correction required to maintain the inbound course and apply it in the opposite direction on the outbound leg. (i.e. if a 5° heading correction to the right of course is required to maintain the inbound course, apply a 15° heading correction to the left on the outbound leg.)

Approaches

Approach Setup

Approach set-up should occur as early as practical but no later than 30 nautical miles from the destination airport. It should include the following:

a. Weather
b. Approach charts
c. Radio frequencies
d. Course/procedure selection
e. Approach briefing
f. Descent/approach checklist

Approach Callouts

VOCALIZE CURRENT WEATHER AND ALTIMETER STATUS.
"DESCENT/APPROACH CHECKLIST COMPLETE"
"LANDING CHECKLIST COMPLETE"
"500 FEET ABOVE MINIMUMS"
"200 FEET ABOVE MINIMUMS, CARB HEAT COLD"
"MINIMUMS"

- "RUNWAY IN SIGHT"
- "MISSED APPROACH POINT, GOING MISSED"

Visual Descent Point

- **VDP in miles** = Height Above Touchdown/300 (when MAP is located at runway threshold)
- **VDP in time** = HAT/(GS÷10)

(THIS CALCULATES TIME TO SUBTRACT FROM MAP TIME WHEN MAP IS LOCATED AT RUNWAY THRESHOLD)

Missed Approach

Missed approach radio, navigation facilities and courses should be set, as much as possible, during each instrument approach procedure before reaching the MAP. On missed approach execution Remember G1000 suspend mode!

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