Private and Commercial QRG

Ground Reference Maneuvers

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

### DA40F

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Altitude</td>
<td>800’AGL</td>
</tr>
<tr>
<td>Power</td>
<td>~ 2350 RPM</td>
</tr>
<tr>
<td>Airspeed</td>
<td>95 KIAS</td>
</tr>
<tr>
<td>Pitch</td>
<td>+4°</td>
</tr>
<tr>
<td>Flaps</td>
<td>UP</td>
</tr>
<tr>
<td>Fuel Pump</td>
<td>ON</td>
</tr>
</tbody>
</table>

### Arrow PA28R-200

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Altitude</td>
<td>800’AGL</td>
</tr>
<tr>
<td>Power</td>
<td>~ 17” MP, 2550 RPM</td>
</tr>
<tr>
<td>Airspeed</td>
<td>100 MPH</td>
</tr>
<tr>
<td>Pitch</td>
<td>+2°</td>
</tr>
<tr>
<td>Flaps</td>
<td>UP</td>
</tr>
<tr>
<td>Fuel Pump</td>
<td>ON</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>KTS</th>
<th>MPH</th>
<th>ALT AGL</th>
</tr>
</thead>
<tbody>
<tr>
<td>87</td>
<td>100</td>
<td>670</td>
</tr>
<tr>
<td>91</td>
<td>105</td>
<td>735</td>
</tr>
<tr>
<td>96</td>
<td>110</td>
<td>810</td>
</tr>
<tr>
<td>104</td>
<td>120</td>
<td>960</td>
</tr>
<tr>
<td>109</td>
<td>125</td>
<td>1050</td>
</tr>
<tr>
<td>113</td>
<td>130</td>
<td>1130</td>
</tr>
</tbody>
</table>

### Performance Maneuvers

**Minimum Altitude**

+2000’AGL

#### Steep Turns

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DA40F</td>
<td>95 KIAS</td>
</tr>
<tr>
<td>PA28R-200</td>
<td>100 MPH</td>
</tr>
</tbody>
</table>

#### Chandelles

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DA40F</td>
<td>VA</td>
</tr>
<tr>
<td>Below 2161 lbs.</td>
<td>94 KIAS</td>
</tr>
<tr>
<td>Upto 2535 lbs.</td>
<td>108 KIAS</td>
</tr>
<tr>
<td>PA28R-200</td>
<td>&lt;131 MPH</td>
</tr>
</tbody>
</table>

#### Lazy Eights

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DA40F</td>
<td></td>
</tr>
<tr>
<td>Below 2161 lbs.</td>
<td>84 KIAS</td>
</tr>
<tr>
<td>Upto 2535 lbs.</td>
<td>95 KIAS</td>
</tr>
<tr>
<td>PA28R-200</td>
<td>110 MPH</td>
</tr>
</tbody>
</table>

#### Steep Spiral

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DA40F Vg</td>
<td>73 KIAS</td>
</tr>
<tr>
<td>PA28R-200 Vg</td>
<td>95-105 MPH</td>
</tr>
</tbody>
</table>
Stalls & Slow Flight

Minimum Altitude

+2000’AGL

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**Slow Flight**

<table>
<thead>
<tr>
<th><strong>DA40F</strong></th>
<th>2200 RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 2161 lbs.</td>
<td>45-47 KIAS</td>
</tr>
<tr>
<td>Upto 2535 lbs.</td>
<td>52-54 KIAS</td>
</tr>
</tbody>
</table>

**PA28R-200**

19” MP 2700 RPM

Bottom of White Arc

55-63 MPH

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**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.

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**Power Off Stalls**

**DA40F**

75 KIAS Landing Config.

**PA28R-200**

75 MPH Landing Config.

Gear and Flaps Extended
# Instrument QRG

## Pitch/Power Table (DA40)

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

\[*V_{tgt} = V_{ref} + 5 + \frac{1}{2} \text{ the steady state wind + gust factor (never to exceed } V_{ref} + 25)\]

**Chart**

<table>
<thead>
<tr>
<th>Airspeeds</th>
<th>1874 LBS</th>
<th>2205 LBS</th>
<th>2535 LBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Climb</td>
<td>54 KIAS</td>
<td>60 KIAS</td>
<td>66 KIAS</td>
</tr>
<tr>
<td>Cruise Climb</td>
<td>60 KIAS</td>
<td>68 KIAS</td>
<td>73 KIAS</td>
</tr>
<tr>
<td>Approach in Cruise settings (Flaps UP or T/O)</td>
<td>60 KIAS</td>
<td>68 KIAS</td>
<td>73 KIAS</td>
</tr>
<tr>
<td>Approach for normal landing (Flaps LDG)</td>
<td>58 KIAS</td>
<td>63 KIAS</td>
<td>71 KIAS</td>
</tr>
</tbody>
</table>
**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**

<table>
<thead>
<tr>
<th>Bank Angle</th>
<th>Lead</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 15°</td>
<td>5°</td>
</tr>
<tr>
<td>15°-30°</td>
<td>10°</td>
</tr>
<tr>
<td>Above 30°</td>
<td>15°</td>
</tr>
</tbody>
</table>

**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.

**Acceleration Compass Errors**

**ANOS** - 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

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

Teardrop

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

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

Parallel

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

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

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 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

- 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 1 minute 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!