

Civil Air Patrol
Texas Wing
Nighthawk Composite Squadron

NOTES ON FLYING THE CESSNA 182 Q & R Models *

Several years ago Dr. John Eckalbar in his book "Flying the Beechcraft Bonanza" described the method of "flying by the numbers". The late Peter Duggin wrote in his "Instrument Flying Manual" about using the formula: **Performance = Power + Attitude + Configuration (PAC)**.

In practice if you want to achieve a certain predictable and repeatable performance from your aircraft then there is a simple method to do this.

For example if you wish to achieve a certain climb performance then a combination of RPM and Manifold Pressure (**Power**), plus a certain degree of nose up (**Attitude**) with gear and flaps up, cowl flaps open (**Configuration**), will give you Best Rate Of Climb (**Performance**)

Using the above methods here's how it works in some typical flight operations.

In training we often do closed circuit pattern flying where there are basically five performance requirements:

- (1) Takeoff
- (2) Climb
- (3) Level off (downwind leg).
- (4) Base Leg
- (5) Final approach (landing).

Breaking down the flight into its five "PACs" would be something like the following:

1. **TAKE OFF.** Using the formula $P+A+C=Performance$, we would align the aircraft with the centerline, with full power, 10° degs. flaps, cowl flaps open, and rotate nose up 10° degrees at 50 Knots.
2. **CLIMB.** Pitch to V_x or V_y (59 or 81 Kts.) Flaps up as speed builds.
3. **LEVEL OFF** (Downwind). On achieving pattern altitude we would push over and trim to level attitude, close cowl flaps, reduce power (Manifold Power to 15 inches), and apply 10° degrees of wing flaps to give us a 90 Knot airspeed for our down wind leg.
4. **BASE LEG.** As we turn to base leg, merely 10 more degrees of flaps (20 degs. total) and add about 2° degs. nose up trim and the airplane will slow to 70 Knots
5. **TURN TO FINAL.** Carburetor heat ON, Power back to idle, full flaps (40° degrees total), and adjust nose trim to maintain 65 - 70 knots for a comfortable approach speed and approximately a 3 degree glide path.

Various "PACS" can be determined for all sorts of flight conditions. The point is that knowing the power, attitude and configurations for various performance requirements can be easily memorized and if you use these consistently your flying will be simplified, smoother and more professional.

Of course conditions such as density altitude, and weight loading as well as wind conditions can change things but you have to start from somewhere and then change certain things for the conditions that exist.

PAC's for special performance requirements.

MAXIMUM PERFORMANCE TAKE OFF (V_x).

Short field take off PAC:

1. POWER.....Hold brakes, apply Maximum MP. (Highest RPM=2400)
2. ATTITUDE.....Slightly tail low.
3. CONFIGURATION.....Cowl flaps open, Wing flaps 20°.
4. PERFORMANCE.....59 Knots (V_x) until obstacles are cleared.

MAXIMUM PERFORMANCE CLIMB (V_y)

1. POWER.....Full manifold pressure, 2400 RPM.
2. ATTITUDE.....10° nose up trim.
3. CONFIGURATION.....Cowl flaps open, Wing flaps 0°.
4. PERFORMANCE.....81 knots (sea level)*

CRUISE CLIMB

1. POWER.....Full Manifold Pressure, 2400 R.P.M.
2. ATTITUDE.....5° nose up trim.
3. CONFIGURATION.....Cowl flaps OPEN, wing flaps 0°.
4. PERFORMANCE.....100 Knots, 500 ft/min. climb. (sea level)*

NORMAL CRUISE

1. POWER.....Full Manifold Pressure, 2300 RPM.
2. ATTITUDE.....Trim for level flight.
3. CONFIGURATION..... Cowl flaps as needed, wing flaps 0°.
4. PERFORMANCE.....138 Knots. (@8000 ft)

Search and Patrol

1. POWER.....18", 2100 - 2300 RPM.
2. ATTITUDE.....Trim for level flight.
3. CONFIGURATION..... Cowl flaps as needed, wing flaps 10°.
4. PERFORMANCE.....90 Knots.

LETDOWN**

1. POWER.....Reduce MP. By 5", 2300 RPM.
2. ATTITUDE.....Level (no change from cruise).
3. CONFIGURATION.....No change.
4. PERFORMANCE.....138 Knots. 500'/min. descent.

LEVEL OFF AT PATTERN ALTITUDE

1. POWER.....15" MP'...2300 RPM.
2. ATTITUDE.....Level or slight nose up trim.
3. CONFIGURATION.....10⁰ flaps cowl flaps closed.
4. PERFORMANCE.....90 Knots level flight.

TURN TO BASE LEG

1. POWER.....15" MP... 2300 RPM
2. ATTITUDE.....2°-3° nose up trim (level flight).
3. CONFIGURATION.....20⁰ Flaps.
4. PERFORMANCE.....70 knots.

TURN TO FINAL APPROACH

1. POWER.....Carburetor heat ON, reduce throttle (idle power).
2. ATTITUDE.....Nose down.
3. CONFIGURATION.....FULL flaps.
4. PERFORMANCE.....65-70 Knots approach. (trim for air speed)

**Most light aircraft will descend approximately 100 ft/min. for each one inch reduction in manifold pressure while maintaining the cruise airspeed.

* The C-182 R and Q models are representative of most CAP Corporate 182"s. These numbers will vary slightly with different aircraft but will be a guide to getting close.

PACS FOR THE CESSNA 182Q

PERFORMANCE	= POWER	+ ATTITUDE	+ CONFIGURATION
NORMAL TAKE OFF Rotate @ 50 Knots	= FULL MP. 2400 RPM	10° NOSE UP	10° FLAPS
MAX PERFORMANCE (Short Field)			
TAKE OFF (Vx) 59 Knots	= FULL MP. 2400 RPM	10° to 15° NOSE UP	20° FLAPS
MAX PERFORMANCE			
CLIMB (Vy) 81 Knots	= FULL MP. 2400 RPM	10° NOSE UP	0° FLAPS
CRUISE CLIMB 100 Knots	= FULL MP 2400 RPM	5° NOSE UP	0° FLAPS
NORMAL CRUISE 138 Knots	= FULL MP 2300 RPM.	TRIM for LEVEL FLIGHT	0° FLAPS Cowl Flaps As Needed
SEARCH & PATROL 138 Knots (@8,000 ft)	= 18" MP 2100 -2300 RPM.	TRIM for LEVEL FLIGHT	10° FLAPS Cowl Flaps As Needed
LETDOWN 138 Knots 500 ft/min Decent.	= *Reduce MP. 5" 2300 RPM.	NO TRIM CHANGE	NO CHANGE
* Most light aircraft will descend 100 ft/min with each 1" of MP reduction.			
LEVEL OFF 90 Knots	= M.P. 15" 2300 RPM.	TRIM LEVEL	10° FLAPS
BASE LEG 70 Knots	= MP. 15" 2300 RPM.	2°-3° NOSE UP	20° FLAPS
FINAL APR. 65-70 Knots	= Carb. HEAT ON Throttle CLOSED	TRIM NOSE UP	FULL FLAPS