F14 Practical Handling Tips

By Victory 205

Volumes have been written on the subject, including TPS Student Dissertations and numerous NASA technical reports on both F14 handling and departure and spin recovery. This is a simplified practical treatise on how to master the simulated version of the aircraft. Some aspects may feel different to you, depending upon your rig and control setup.

First, the aircraft is a joy to fly, and you will find the feedback and required inputs magical after just a few hour's experience. That's about all the time it takes to get familiar, if you approach learning to fly the F14 with an open mind. Very rewarding after flying the sterile and feelingless FBW fighters.

You may find that you like analog flight instruments better than digital too. For example, it is easy to glance at an airspeed indicator and back at the VDI without dwelling on the ASI. Your "mind's eye" will retain the needle location and picture as you check attitude on the VDI. Instrument rated pilots know what I am referencing. The rate of movement on an analog gauge is very helpful in determining acceleration or deceleration rates as well, and the rate of descent is obvious on a spinning altimeter as you plunge towards the earth with a pegged VSI.

So let's discuss Handling, then Departure Characteristics and Spin Recovery (probably in a different post). Some of the NATOPS manuals you may find online have erroneous information with respect to the effects of SAS and ARI, because some of the later Digital and upgraded systems didn't make it into the airplane or the sim. This is a good thing.

Normal, one G flight, cruise configuration-

Roll using coordinated rudder and lateral stick. The faster you are, the lower the AOA, and therefore less rudder input is required. You can happily fly with feet on the floor flying instruments enroute. The aircraft has triple channel fail safe YAW stability augmentation, so don't get the idea that you are going to die if you don't use rudders in normal flight.

The aircraft also rolls faster than what you have read in missives written by people who haven't flown a Tomcat. It really isn't a tactical issue in 99% of the envelope. In a sim, with small controllers with tiny control throws, you probably won't be bothered by roll rate.

Landing configuration-

You need coordinated rudder and lateral stick in the landing pattern. You are essentially flying on instruments around the bird farm, but remember that you are at a medium alpha, albeit with high lift devices deployed. Some may get better results when rolling by leading with rudder, but that is mostly to ensure that you are indeed using enough rudder. It doesn't require a boot full of dramatic input, just some pressure to coordinate and counter adverse yaw during approach. This is worse with stores and especially tanks, but it isn't as much of a factor as many purport. Mostly a factor during in-close lineup corrections when you need to input significant lateral stick.

If you can fly a Cub in coordinated flight, you can fly a Tomcat in the landing pattern, at least until you hear the words "Roger Ball" on the radio. After gaining experience employing the high alpha techniques described below, the landing pattern won't be a problem.

By the way, the F14 buffets in one G flight with the flaps down.

Maneuvering flight-

As you begin to operate in the Air Combat Maneuvering realm of flight, your first goal is to become familiar with buffet feedback in relation to Angle of Attack. Buffet in a PC simulator comes in the form of sound and visual movement of the cockpit on your screen. *Turn up the volume.* The Tomcat gives wonderful feedback in terms of buffet cues, so much so, that you may not need to look at the AOA Indicator. You certainly didn't in the aircraft.

If you are feeling and hearing light buffet, you need to coordinate rudder and lateral stick. So light buffet, ensure that you are using coordinated rudder. This should occur at around 11-12 units under typical maneuvering speeds and G loadings. If the aircraft is rolling in the direction of rudder and lateral stick input, you're fine.

As you increase to higher alpha, beginning about 15-17 units, you will feel and hear a subtle increase in buffet intensity. This is the area where rudder begins to dominate due to side slip causing roll moments. You may find that attempting to roll with lateral stick only, results in a lower roll rate, or perhaps a hesitation followed by roll in the direction of lateral stick. This is called a clue. It is time to use the rudder to roll. To sample this, set up at 300 knots or so, roll into a bank of sixty degrees or so, add approximately mil power and perform a horizontal turn, pulling the nose along the horizon. Increase AOA to medium buffet at 15-17 with aft stick, you may need a little nose low attitude to sustain your speed. Now introduce a smooth lateral stick input only. Sample the roll behavior. Now set up again and do the same thing with rudder only. Try it with coordinated rudder and lateral stick. You may find that rudder results in higher roll rates than lateral stick.

Beginning to get interesting, isn't it?

Try a roll reversal while holding in the currently set aft stick value. Does the nose describe an arc above the horizon? Is the AOA spiking? This tends to occur at slow speeds and extreme AOA's in the flat scissor type of scenario. If so, then as you roll, ease the pull slightly as the wings approach and traverse wings level. If you started the roll with rudder, don't unload until the aircraft is in fact, rolling. If you unload before you roll, then you are probably back into the AOA regime where lateral stick dominates, and the aircraft yaw, but won't roll very quickly with rudder.

Completely unloading (which means reducing AOA for our purposes here) before rolling increases the time to reverse, and gives up angles to your opponent. If you do that, remember that you will be rolling at a lower AOA, and need coordinated rudder and lateral stick. Other than the flat scissors technique, I had never heard of "flying the cross", or unloading significantly in a fight to roll. The aircraft rolls fine using the techniques described here. Master rolling with rudder with a quick little unload in the middle, and practice keeping the stick centered laterally while rolling with rudder.

As AOA increases, you should feel the buffet cues increase dramatically in intensity. As you approach 20 units or above, the aircraft will stop responding to lateral stick. At very high alpha, the aircraft tends to hesitate for a moment, then roll *opposite to lateral stick*. In this regime simply center the stick and roll with smooth rudder inputs only. The aircraft is completely and precisely controllable using smooth rudder inputs for roll. If you are flailing, ensure that the stick is centered (I used to brace my elbows on the canopy rails with both hands on the stick), and use smooth rudder inputs. Don't stomp like a

fat Cowboy line dancing at a Honky Tonk, prance on those rudder pedals like a ninety three pound ballerina with sore toes.

This is all very natural and only takes a few minutes of experimentation to learn. Any time lateral stick results in either no roll or opposite roll, center the stick and roll with rudder only.

Crossed Controls

You can actually increase roll rate at high alpha by rolling with rudder in the desired direction and nudging a little opposite stick. I wouldn't be too quick to try this, because it can get away from you and induce a departure. In fact, it is a departure from controlled flight for a brief moment.

Wing Rock

The aircraft is relatively stable at extreme AOA. With the wings level, stick in your lap and AOA pegged, you will have massive drag and a high descent rate. The aircraft can be "parked" this way with the nose 15-25 degrees above the horizon, but it will be falling like a greased man hole cover. It may wing rock- Let it.

There is a lot going on here with strong vortices coming off of the intake edges that flow back and impinge on the vertical fins. They will attach and detach with yaw and roll moments as well. Countering wing rock with rudder is difficult to time and attempting to do so usually make it worse and often result in Pilot Induced Oscillations. Attempting to counter it with lateral stick can be your introduction to a departure from controlled flight. If you get wing rock, ensure that the stick is centered. If the wing rock diverges, then you will have to reduce AOA to regain control to avoid going for a ride.

There is more going on due to wingsweep and maneuvering flaps, but this describes what you will deal with the most. As the wings sweep aft at high velocities, the buffet cues change slightly, but you will be G limited before you get into AOA trouble at high speeds with the wings fully aft.

This is the basic mindset with which to approach ACM maneuvering.

General Stability Characteristics.

Also, as the aircraft accelerates, causing the wings to sweep aft, the center of lift also moves aft. This is countered to some degree by compensating trim, but the nose will tend to diverge and won't come back to trim speed. Simply re-trim. If you manually sweep the wings aft at a constant speed, then the nose will pitch down gently. Again, re-trim and you are back in business. The reverse is also true, and sweeping the wings forward causes a small pitch up.

Sweeping the wings aft manually for the break maneuver is done to increase drag and make the aircraft smaller for closer formation. It looks better too. Delta wings decelerate under high G quickly due to their high induced drag characteristics. Aft sweep results in higher roll rates and more lateral sensitivity also. You are flying a constantly changing airplane.

In formation, wing movement as the aircraft accelerates or decelerates causes the center of lift to change, so you get corresponding, small magnitude pitch changes. The wings also don't move in sync between aircraft, and the wing movement isn't smooth under G, so the F14 was not a great formation aircraft. For formation aerobatics, we put the wings into the "fixed" BOMB mode to avoid this phenomenon. We also tanked in the BOMB mode or at least moved the wings manually aft of the CADC schedule to avoid wing movement and pitch bobbles while

dueling with the basket. It also resulted in a higher pitch attitude when tanking and helped to get our tails out of the jet exhaust and tip or stab vortices of some of the tanker platforms.

Roll stability is neutral. If you roll into an angle of bank at one G and release the lateral stick input, the bank will normally stay constant. It's like flying with control wheel steering engaged on an autopilot. The aircraft is quite stable for just flying from O'Club to O'Club to drink crummy beer from plastic cups.

More to Come

This should familiarize you, dispel many of the myths circulating out there and reduce surprises in the air. We'll talk departures next.