

Let's see if we can clear up the confusion surrounding the Flap/Slat and Spoiler Systems.

Flap operation is separated into two operational regimes- Takeoff/Landing and Maneuvering flight. When I write "Flaps", I am also including Slats for this discussion. I am also going to refrain from mentioning specific spoiler angles and esoteric control configuration biases that occur since they really doesn't matter for our purposes.

Max Landing Flap Extension speed is 225 KIAS. They are retracted after takeoff at 180 KIAS so as to be fully up by 225 KIAS

Takeoff and Landing Flaps

These high lift devices are controlled by the Flap Handle outboard of the throttles. With the wings fully forward, moving this handle causes all flap panels to extend or retract. Landing slats extend to 17 and flaps to 35 degrees, creating a full span high lift wing for carrier ops.

The outer flap panels are called "Main Flaps" and the innermost flap panels are called "AUX Flaps", The AUX Flaps are separated out of necessity from the main flaps because of wing sweep.

The MAIN flaps extend proportionately with flap handle position.

The AUX flaps extend fully if the flap handle is moved beyond 5 degrees, and retract fully if the flap handle is less than 5 degrees. It's all or nothing for AUX flaps.

When the wings are swept for any reason aft of 21 degrees the AUX flaps do not extend. This makes sense, as the flaps would conflict with the fuselage. The MAIN flaps continue to work until wing sweep reaches 50 degrees.

If the wings are swept aft of 50 degrees, then MAIN flaps will not extend. Wings aft of 50 degrees means no flap operation whatsoever. You are now a high lift, flapless delta wing fighter.

When the wings are aft of 50 degrees, the flap handle is locked and will not move.

This is obviously not the case for a PC controller, so you can move your physical controller, but the virtual flap handle visible in the simulator will not visibly move.

Conversely, when the AUX flaps are extended the wings will not sweep aft of 22 degrees.

When the MAIN flaps are extended, then the wings will not sweep aft of 50 degrees. This concerns MAIN flaps only.

The flaps run off of the combined hydraulic system with backup from the outboard spoiler module for MAIN flaps and slats only (no AUX flaps, resulting in a 6 knot increase in landing speed)

The AUX flaps only will blow back with an airspeed overspeed. A REDUCE SPEED caution light illuminates with Master Caution during overspeed.

Don't reverse the flap direction while they are in operation. It can damage the drive system.

In the sim, there is no reason to assign an axis to the flap control. Essentially, the landing flaps are full up or down.

Maneuvering Flaps

The maneuvering flaps use only the MAIN flap panels, and are controlled by the thumbwheel on the stick with the Landing Gear and Flap handles UP, and also deploy automatically as a function of angle of attack. They extend at 10.5 AOA and retract at 7.7 units AOA, generally speaking. Higher Mach numbers modify this slightly.

The pilot can override automatic extension by using the thumbwheel.

The flap handle outboard of the throttle quadrant *does not control maneuvering flaps*.

The thumbwheel on the stick controls maneuvering flaps proportionally. They can be manually extended to a partial position using the thumbwheel or by the CADC based on Mach and AOA.

In the sim, there is no need to map an axis, and holding and releasing a switch will stop the maneuvering flaps when released. Map a four way switch on the stick. Up (FWD) for retract, Down (AFT) for extension. Same controller as DLC, more on that in a moment.

Slats extend to 7 degrees and flaps extend to 10 degrees. The same interlocks apply as above.

If the aircraft accelerates to beyond the Mach number for a wingsweep value of 50 degrees to greater, then the maneuvering flaps will retract. This is different than the MAIN flaps being extend to the landing position. Again, you are a high lift delta winged fighter.

If maneuvering flaps are extended when the landing gear handle is moved to down, then they retract automatically to facilitate normal landing flap operation by the Flap Handle.

Manually extending maneuvering flaps can help with slow speed intercepts or tanking evolutions.

Takeoffs

F14B - Performed with Full Flaps Extended, with flaps completely retracted, or with maneuvering flaps extended. In the B, all takeoffs at land or sea are done in mil power.

At the ship, all cat shots are performed in mil power with Full Flaps extended.

F14A - Flaps up or maneuvering flaps takeoffs are performed in Zone 5 afterburner only.

Flaps down Zone 5 afterburner takeoffs are authorized also.

If a military power takeoff is performed at the field in order to reduce fuel consumption, then Full Flaps are required. No reduced flap or clean wing takeoffs unless Burner is available and used.

Shipboard takeoffs always use Full Flaps, with either Zone 5 afterburner or Military Power as required by takeoff gross weight and catapult limits.

Rough Gouge on field takeoffs in any configuration is to rotate smoothly at 140-150 KIAS and let the aircraft lift off when it is ready to fly. 3 degrees ANU trim works fine for all takeoffs as well.

Spoilers and DLC

The spoilers are grouped into inboard and outboard spoiler pairs. Four on each wing, eight total.

All spoilers are used for roll control augmentation and ground braking.

Inboard spoilers only are used for carrier landing flight path control via DLC (Direct Lift Control).

The Outboard Spoilers have a separate hydraulic power source called the Outboard Spoiler Module. The Inboard Spoilers are powered by the Combined Hydraulic System.

Roll Control

In flight roll control is straightforward. All four spoilers on each wing are used and are biased out at wing sweep angles above 62 degrees. Beyond that, roll is stabilator differential only.

Ground Braking

On the ground (Weight on Wheels), with both throttles at idle, and the ANTI SKID SPOILER BK switch in BOTH or SPOILER BK (in other words, not in the OFF position), all eight spoilers will be extended to aid in aerodynamic braking. They are armed before takeoff ashore in case of abort. They will retract when throttles are moved forward for takeoff. This assumes hydraulic pressure is available to the spoilers.

This is a big deal as removing lift aids wheel braking immensely. Full aft stick aids aerodynamic braking dramatically during landing rollout also.

SPOILER BK enables Ground Spoilers only.

BOTH enables the Anti-Skid Wheel Brake System along with Ground Spoilers

This is an even bigger deal as Anti Skid prevents wheel lock and skids. Landing with carrier pressure in the tires (350 psi) on a wet, ungrooved runway is sporting.

Below 10 knots ground speed, the Anti-skid system can inadvertently detect a wheel lock up and signal a brake release, so it isn't used for taxiing, especially aboard the ship.

Ground spoilers are kept in the OFF position for carrier operations. With the ANTI SKID SPOILER BK switch OFF, all eight flight spoilers still work normally as described.

If your spoilers pop up after landing at the ship, then you didn't properly do your Landing Checklist. You owe the Air Boss and the Controlling LSO a bottle of the spirits of his or her choice. They don't choose their booze cheaply...

On the ground, extending Landing Flaps causes the Outboard Spoiler Module to energize. It tends to overheat, so you will see references in NATOPS about pulling CB's to prevent this. Flaps were extended just prior to taking the runway or catapult to minimize module heating.

If you retract the flaps with the Spoilers Extended because the ANTISKID SP BK switch is not OFF, then the outboard Spoilers will remain extended, and you will taxi in looking like a dork. Turn the switch off first, then retract the flaps as per NATOPS checklist.

DLC

Direct Lift Control uses the inboard spoilers only and is actuated via the same thumbwheel as maneuvering flaps. It's spring loaded to neutral, and spoilers extend or retract proportionally.

The original configuration by the way, used all eight spoilers, but at a lower neutral extension angle. The later version that we have modeled in the sim works better. Thank you Heatblur.

DLC operation requires Flaps greater than 25 degrees (ie, Landing Flaps), Throttles less than Mil (DLC auto stows above mil for go arounds, bolters or touch and goes), Inboard Spoilers Operating with good Combined Hydraulic Pressure, and the Pitch and Yaw B computer operational that you don't care about.

Engaging DLC causes the inboard spoilers to go to a raised, neutral position. This allows the pilot to extend or retract from this position to instantly control aerodynamic lift in either direction. Down seems to work better in practice.

Engagement, and any subsequent DLC inputs also cause a stabilizer input to offset the corresponding pitch moments. Initial engagement causes a mild pitch down.

In the real aircraft, DLC engagement is clearly felt in the seat of your pants, as is actuation. Heatblur is working to simulate this a little better in the module. In the sim, you will have to look to see if the spoilers are extended in the neutral position, and give a quick bang in the down direction to ensure that they extend further.

You can see this as a mild pitch down if you are looking forward, but it is a total reduction in lift, not just pitch.

The spoiler indicator also shows inboard spoiler extension, but it is very difficult to see in the sim, and probably worse in real life. The indicator is a microscopic flip flop chicklet.

You don't need an axis mapped for DLC, just the same four position switch that you mapped for maneuvering flaps. In this case, it is controller position "UP" (towards the stick forward position) for DLC "Down" (or spoiler extension), and "DOWN" (towards the stick aft position) for DLC "UP" (spoiler retraction).

Just map it logically using the DLC/Maneuvering Flap keymap and see what happens. Flip it if you end up backwards. You'll know when you hit the back of the ship and end up in the potato locker.

You have noticed by now, that lots of switches in the F14 do multiple functions depending on Weight on Wheels, Gear/Flap position, etc.

You also need a switch mapped to turn it on, which would be "Right" or "In" for the thumb button on the side of the stick. That also deploys countermeasures in the air. Fun, eh?

If you trying to map DLC to an axis, then unless it is spring loaded, you're going to introduce a big mess in terms of flying approaches with variable lift. **See my nifty Case I Landing Tips Paper for suggestions on how to use DLC.**

This are the basics of some of the secondary flight controls. For more nuances and depth, see NATOPS. Have a nice nap.