F-35 Identification 101

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For those not intimately involved in the F-35 program, distinguishing one F-35 variant from another can be confusing. The A, B, and C models, after all, look similar. Unsurprisingly, the average score for the five-question F-35 identification quiz on this website has been a low D (sixty-two percent). The quiz has been taken more than 10,000 times. While the quiz itself offers a few tips on how to tell the variants apart, a more thorough, albeit not exhaustive, list of identification tricks and tips may help sharpen everyone's F-35 spotting skills. So next time you see a photo of an F-35, you can impress your friends by correctly naming the variant.

After reading this article, see how you do on our expert-level ten-question F-35 identification quiz.

The A, B, and C models of the F-35 look similar. Telling them apart requires some background knowledge. This image shows two F-35As and one F-35B (farthest away). Photo by Chad Bellay

The F-22 Raptor and the F-35 Lightning II look similar as well, especially from certain angles and at a distance. Both the F-22 and F-35 have two intakes, two tails, and similar planforms. Photo by MSgt. Shane A. Cuomo

From behind, the twin, rectangular thrust-vectoring exhaust nozzles on the F-22 are an obvious difference. The F-35 has one round exhaust nozzle for its single engine. Photo by Carl Richards

The geometry of the engine intakes distinguishes the two aircraft from the top and side. The Raptor's intakes angle back. On the Lightning II, they point forward. Intake differences are visible from the front view as well. Opposing sides of the F-22's intakes are parallel. The corners are slightly rounded. The F-35's intake angles are sharper. A space between the intake and the fuselage, called a diverter, is found only on the Raptor as well. The F-35's diverterless intake sits flush to the fuselage. Top Photo by Tom Reynolds; Bottom Photo by Carl Richards

The underside of the F-22 is much flatter than that of an F-35. Photo by MSgt. Shane A. Cuomo

The F-22 has one main (though split) weapon bay with two doors. The F-35 has two distinct main weapon bays each with two doors. Top Photo by Andy Wolfe ; Bottom Photo by Katsuhiko Tokunaga

One Step Back

Before getting into A, B, and C differences for the F-35, a short primer on how to tell an F-35 from an F-22 may help avoid an even larger fighter faux pas. After all, the F-22 and F-35

look similar as well, especially from certain angles and at a distance. Both the F-22 and F-35 have two intakes, two tails, and similar planforms.

If the two aircraft happen to be parked together, the F-22, however, is noticeably larger. The Raptor is about ten feet longer than a Lightning II. Its wingspan is about ten feet wider than an F-35A's and F-35B's, and roughly the same as an F-35C's.

From behind, the twin, rectangular thrust-vectoring exhaust nozzles on the F-22 are an obvious difference. The F-35 has one round exhaust nozzle for its single engine. The geometry of the engine intakes distinguishes the two aircraft from the top and side. The Raptor's intakes angle back. On the Lightning II, they point forward. Intake differences are visible from the front view as well. Opposing sides of the F-22's intakes are parallel. The corners are slightly rounded. The F-35's intake angles are sharper. A space between the intake and the fuselage, called a diverter, is found only on the Raptor as well. The F-35's diverterless intake sits flush to the fuselage.

The single- vs. twin-engine difference plays out on the top sides of the two aircraft as well. The F-22 has two humps between the tails. The F-35 has just one. On the underside, the F-22 is much flatter with one main (though split) weapon bay with two doors. The F-35 is more rounded and has two distinct main weapon bays each with two doors. Taxiing, the F-22 sits about a foot lower than an F-35.

Context also matters. If the airplane in question is operating from an aircraft carrier, landing vertically, taking off in a very short distance, or displaying non-USAF markings, it's not an F-22.

Context And The F-35 Variants

When it comes to distinguishing among F-35 variants, context can provide some tips as well. If the F-35 in question is being catapulted from a carrier, it's an F-35C. If it's landing vertically, it's an F-35B. If it has Royal Air Force markings, it's an F-35B. If it has international markings that aren't associated with the RAF, it's an F-35A (at least until another international air force procures B or C models).

Basic A, B, & C Differences

The A model is most easily distinguished from other F-35 models by the blister on the upper left side for its internal GAU-22/A Gatling-type gun. (B and C models do not have internal guns.) Like the B model, the F-35A has a smaller wing. The A model is the only F-35 variant with a refueling receptacle on its dorsal spine. The receptacle markings are clearly visible from the top view.

The B model is most easily distinguished from other F-35 models by its vertical lift system. The system comes into play at almost every viewing angle of the aircraft. Even in up-and-away

(non vertical) flight, the F-35B has visual clues for the vertical lift system. The lift fan door flattens the upper surface of the F-35 just behind the cockpit, giving this model a distinctive hump. The hump is especially noticeable from front and side perspectives. The lift fan itself abbreviates the aft end of the canopy line as well.

Panel lines and markings are associated with the lift system are visible on the top and bottom sides of the F-35B. From above, panel lines for the lift fan door and the auxiliary air inlet are visible. From below, the doors for lift fan exhaust appear just behind the front landing gear doors. The aft end of the lower fuselage also has a seam for the doors that open when the three-bearing swivel duct goes into action in STOVL mode. (The A and C models have a hump in this location where their arresting/barricade tailhooks are stored.) The B model also has a diamond-shaped roll duct on the underside of each wing.

The C model is most easily distinguished from other F-35 models by its larger wing, which provides almost fifty percent more wing area than the A and B models. The hinge line for the wing fold is visible from top and bottom views. The F-35C wing has an additional control surfaces, called ailerons, on the trailing edge as well (two control surfaces on each wing instead of one). The inner control surfaces on the F-35C wing and the ones on the A and B are called flaperons. The landing gear on the F-35C is noticeable beefier. The nose gear has two tires and a launch bar that extends forward and upward from the wheels.

Another Trick: Markings

Markings can also be used to distinguish F-35 variants. US Air Force markings equate to the A model. US Marines to the B or C model. (The Marine Corps is purchasing eighty C models.) And US Navy to the C model only. The Air Force puts the aircraft identification number, or serial number, on the tail (F-35A). The US Marines and Navy put their identification numbers, called Bureau numbers, on the empennage just below the horizontal tails. To make identification somewhat easier, the F-35 variant designation appears just above the bureau number for the US Marine Corps and Navy. Unfortunately, because of their location these markings are not apparent in most photos. International operators have their own specific requirements for markings.

Other Notes

As noted in a previous Code One article, Norwegian F-35s will be distinguishable by a small, aerodynamically clean bump on the upper fuselage between the two vertical tails. The bump contains a dragchute.

Nosebooms are peculiar to flight test F-35s dedicated to flight sciences testing.

The major differences between the X-35 demonstrator aircraft, which are no longer flying, and F-35 were covered in another previous Code One article.

Basic Cheat Sheet

The F-35A has a small wing, full canopy, gun blister on the left upper side, and aerial refueling receptacle markings on its dorsal. It has no panel lines or markings associated with a STOVL lift system.

The F-35B has a small wing, distinctive fuselage hump and abbreviated canopy (thanks to the lift fan), refueling probe on the right side, and numerous markings, panel lines, and actual hardware associated with its vertical lift system.

The F-35C has the big wing, wing folds, ailerons, full canopy, refueling probe on the right side, and a launch bar and two tires on the front landing gear. If the aircraft has Navy markings, it's an F-35C.