Flight Characteristics

Flight By Wire

In 1993, the C17 Globemaster III became the first military aircraft to feature a complete Electronic Flight Control System, also known as Flight by Wire system. The FBW system utilizes force sensors on pitch, roll and yaw axes to provide pilot commands to four separate Flight Control Computers. These FCCs combine the commands and apply the output commands to the control surfaces (Elevators, Rudder and Ailerons). The fly-by-wire computers act to stabilize the aircraft and adjust the flying characteristics without the pilot's involvement (eg. aircraft holds the attitude), and to prevent the pilot from operating outside of the aircraft's safe performance envelope.

As a result of the FBW System, the aircraft will actively attempt to hold attitude and roll, as long as it is safe to do so (eg. aircraft is not at risk of stall) by automatically adjusting the trims and control surface input. In essence, the aircraft will follow and keep the pilot's commands.

FBW can be deactivated from the Flight Control System panel overhead. Deactivating FBW will therefore use the Mechanical backup system, and the aircraft will no longer hold attitude automatically

Backside Flying

One of the most distinctive characteristics of the C-17 Globemaster III is how its flaps interact with the engine thrust, a concept known as **Externally Blown Flaps (EBF)**. Unlike conventional aircraft, where flaps primarily increase wing lift by changing the wing’s camber, the C-17’s flaps extend into the jet exhaust streams from its engines. This interaction directs a portion of the engine thrust downward, effectively converting some forward thrust into **additional lift**.

This system, referred to as **powered lift**, gives the C-17 exceptional short-field and high-angle-of-attack capabilities. During approaches or maneuvers with high flap settings, this powered lift allows the aircraft to maintain controlled flight even at **very low airspeeds**, something that would be challenging for conventional large transports. Pilots often refer to this flight regime as **Backside Flying**, because the usual relationships between pitch, airspeed, and climb/descent behavior are inverted compared to standard flight.

In powered lift mode:

- **Thrust directly controls the flight path angle and vertical speed**, allowing precise control over climb or descent without large pitch adjustments.
- **Pitch primarily controls airspeed**, rather than the flight path, which is the opposite of normal jet transport behavior.

The effects of the Externally Blown Flaps on the C-17 become most pronounced at high flap settings, typically flaps 25 to 40 (depending on configuration and weight). In lower flap settings (e.g., flaps 5-15), the effect is present but much less pronounced, and the aircraft behaves more like a conventional jet transport. This effect is therefore more present at low speeds.

Tactical Descents

The C-17 Globemaster III can execute a rapid tactical descent from FL300 to FL50 in less than two minutes by utilizing reverse idle thrust, and in some cases, Spoilers and Flaps to increase drag and accelerate the descent rate, which can exceed 15,000 feet per minute. This aggressive maneuver, often employed in combat scenarios to avoid detection or threats, involves a steep descent angle and requires precise control by the flight crew to maintain safe airspeeds while shedding altitude quickly.