

Advisory Wire

REFERENCE NO: AW700-73-0830

INFORMATION
TYPE:

Maintenance
Operational

ATA: 73-00

EFFECTIVITY: Global 7500 (70006 – 70999)

**SUBJECT: Engine Hot Start
Accommodation**

1. REFERENCES:

- 1.1. GE Fleet Highlites - Passport | Hot start accommodation (21-1Q-7200-02)
- 1.2. Global 7500 Airplane Flight Manual (AFM) – Chapter 3 Non-Normal Procedures – Engine
- 1.3. Global 7500 Airplane Flight Manual (AFM) – Chapter 2 Limitations – Power Plant

2. INTRODUCTION:

This Advisory Wire (AW) is to inform Operators about engine pulsations reported due to the fuel flow and ignition turning off and back on during the engine start phase on a hot weather day. A recent article (attached) has been published by our engines supplier General Electric (GE) regarding a Hot Start Accommodation logic. (Ref 1.1)

3. DESCRIPTION:

Some Global 7500 pilots have reported pulsations due to the fuel flow and ignition turning off and back on during the engine start phase. Upon investigation, GE determined that the pulsations were related to a logic in the Electronic Engine Controller (EEC) preventing potential hot starts on those engines.

If the hot start accommodation logic is unable to start the engine following 3 pulses, the Caution CAS message L ENG START ABORTED or R ENG START ABORTED will be posted and the engine will shut down automatically.

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4. ACTION:

There is no action required by the pilots when the hot start accommodation logic is initiated. In a few events, it has led to an aborted Start with the associated the L ENG START ABORTED or R ENG START ABORTED caution message. If the crew encounters this scenario, they are to follow the instructions in the AFM (Ref 1.2) and respect the “Starting cranking limits” for these CAS messages (Ref 1.3).

Bombardier is currently working with GE to investigate this condition. Additional details will be communicated by further revision of this Advisory Wire.

Should you have any questions pertaining to this AW or require additional information, please contact your Bombardier Field Service Representative (FSR) or the Customer Response Center (CRC 24/7) team.

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Passport | Hot start accommodation (21-1Q-7200-02)

Some Global 7500 pilots have reported feeling pulsations during the start phase on Passport engines. Upon investigation, GE determined that the pulsations were related to potential hot starts on those engines. The Passport starting logic has built-in accommodation for potential hot starts to help protect engine hardware. This article describes the Passport hot start logic.

Hot start logic

A high temperature engine start is detected during a ground or air start attempt when the measured high pressure turbine (HPT) exhaust gas temperature (EGT) or Inter-Turbine Temperature (ITT) exceeds a value of 10°Celsius (°C) below the start redline limit. For ground starts, the redline limit is 750°C and for air starts the redline limit is 875°C. The FADEC system hot start accommodation for a ground auto start or air start performs the following actions:

1. Both fuel flow and ignition are interrupted for at least 3.75 seconds during on-ground auto starts or 1.2 seconds during in-air starts. Engine motoring via the starter continues during this time.
2. The FADEC system decreases the fuel flow schedule during subsequent start attempts
3. System waits until the measured EGT is at least 10°C below the hot start EGT limit OR until fuel and ignition have been interrupted for a total of 5.0 seconds before attempting to start again
4. Once step (3) above is met, the system re-introduces fuel flow (at the decremented flow level) and dual ignition is turned on to attempt to start the engine.
5. If necessary, the FADEC system will repeat this cycle two more times, after which it will abort the start for a ground auto start.
6. For in-air starts, if the third start attempt fails, subsequent start attempts are made with the fuel decrement set to the third attempt level and the EGT start limit increases 25°C for each subsequent start attempt, up to a total of 375°C increase.

NOTE: For ground manual starts, the hot start accommodation is disabled, and the start will be aborted when EGT reaches 750°C.

It is during this hot-start accommodation procedure that the pilots may feel some pulsations due to the fuel flow and ignition turning off and back on. These pulsations are normal for hot start accommodation.

In service example

Figure 1 shows a field example of how the hot start accommodation works. This event demonstrates a case where the right-hand engine (RHE, shown in purple) started normally, but the left-hand engine (LHE, shown in black) reached the hot start temp of 740°C and the hot start accommodation was initiated.

The top graph shows the EGT values for both engines. The second graph shows the fan speed (%N1) for both engines. The third graph shows the core speed (%N2) for both engines. The bottom graph shows the fuel flow for both engines.

In this example, the RHE was started prior to the LHE and the peak EGT value on the RHE was 738°C. Shortly after the EGT peak, the RHE reached the fan idle speed of ~26.5%, core idle speed ~76% and the EGT dropped to ~565°C.

The LHE initial start attempt reached the Hot Start accommodation temperature of 740°C prior to reaching idle speed. Once 740°C was met, the fuel flow on the LHE was cut. After the EGT drops to an acceptable level, fuel flow is re-introduced, and on the second start attempt, the LHE reaches the idle speeds before reaching 740°C EGT.

Recommendation

The Passport auto-start logic contains hot start accommodation. During a hot start accommodation, pulsations may be felt by the aircraft crew. This is a normal phenomenon.

If your aircraft is on On-Point or on the GE Diagnostics plan, GE is monitoring your aircraft for this type of start accommodation and tracking the engines for degradation in the starting system.

Hot Start Field Event

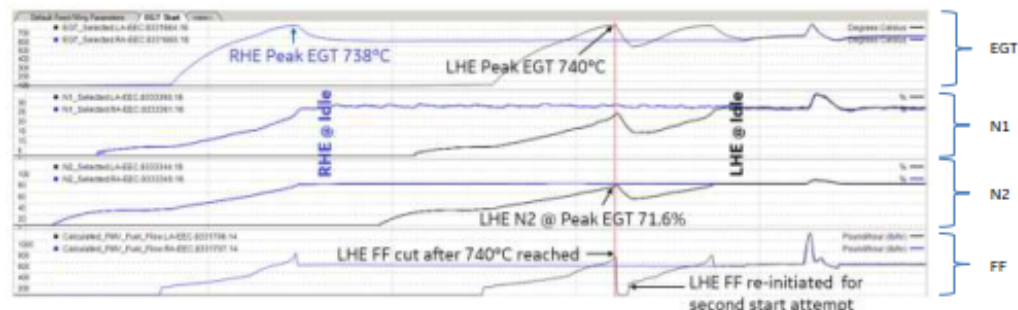


Figure 1: Hot start field event