

Boeing 787 Flight Management Computer Users Guide



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The Boeing 787 Dreamliner is a remarkable advancement in aviation technology, offering enhanced efficiency, comfort, and safety. Central to its operation is the Flight Management Computer (FMC), a critical component that aids pilots in managing flight paths, navigation, and aircraft performance. This article serves as an extensive guide for users of the Boeing 787 FMC, detailing its functions, features, and best practices.

Understanding the Flight Management Computer

The Flight Management Computer is an advanced avionics system that performs numerous vital functions for the flight crew. It integrates several systems and provides interfaces for navigation, performance calculations, and automated flight operations.

Key Functions of the FMC

The primary functions of the FMC include:

1. **Flight Planning:** Allows pilots to input waypoints, airways, and altitude constraints, enabling the creation of a detailed flight plan.
2. **Navigation:** Calculates the aircraft's position using various navigation inputs, including GPS, inertial reference systems, and VOR/DME.
3. **Performance Management:** Computes data for optimal fuel consumption, weight limits, and thrust settings based on current conditions.
4. **Autothrottle Control:** Works in conjunction with the autothrottle system to maintain the desired speed throughout the flight.

5. Route Management: Facilitates changes to the flight plan during the flight, including diversions and alterations due to weather or air traffic control instructions.

Components of the Boeing 787 FMC

The Boeing 787 FMC consists of several key components that work together seamlessly:

- Control Display Units (CDUs): The primary interface for pilots to input data and receive information. Each pilot has access to a CDU, allowing for redundancy and ease of use.
- Flight Management System (FMS): The backend software that processes data, performs calculations, and manages the overall flight plan.
- Navigation Database: A regularly updated collection of waypoints, airways, and other pertinent navigation information critical for flight planning and navigation.
- Performance Database: Contains performance data for various aircraft configurations, including thrust settings, fuel consumption, and weight limits.

Basic Operations

To effectively operate the FMC, pilots must familiarize themselves with its basic functions. Here's a step-by-step guide to performing common tasks:

1. Initializing the FMC

- Power Up: Ensure the aircraft is powered up and the FMC is operational.
- Set Position: Input the current position of the aircraft using GPS coordinates or a known waypoint.
- Select the Flight Plan: Access the flight plan page and input the departure and destination airports.

2. Creating a Flight Plan

- Waypoints: Enter the desired waypoints in the order they will be flown. This includes departure and arrival procedures.
- Airways: If applicable, select and input any airways to be used during the flight.
- Altitudes: Specify any altitude constraints or changes along the route.

3. Reviewing the Flight Plan

- Check the Route: Review the entered flight plan for accuracy, ensuring all waypoints and altitudes are correct.
- Performance Data: Access the performance page to compute takeoff and landing data.

4. Executing the Flight Plan

- Activate the Route: Confirm the flight plan and activate it for navigation.
- Monitor Progress: Use the CDU to monitor the aircraft's progress along the route, making adjustments as necessary.

Advanced Features of the FMC

The Boeing 787 FMC is equipped with advanced features that enhance its functionality and usability:

1. Auto-Routing and Rerouting

The FMC can automatically re-route the aircraft based on current air traffic conditions or changes in weather. This feature ensures that the flight remains on the most efficient path, enhancing safety and fuel efficiency.

2. Performance Optimization

The FMC continuously analyzes performance data, adjusting thrust settings and speeds as required. This feature is particularly useful during climbs and descents, helping to save fuel and improve overall efficiency.

3. Integration with Other Systems

The FMC works in conjunction with other systems, such as the autopilot and autothrottle, to provide a fully integrated flight experience. This integration allows for smooth transitions between manual and automated flight modes.

Best Practices for FMC Usage

To maximize the effectiveness of the FMC, pilots should adhere to the following best practices:

- **Regular Training:** Participate in regular simulator training to stay proficient with FMC operations and updates.
- **Preflight Checks:** Always conduct thorough preflight checks of the FMC and associated systems to ensure they are functioning correctly.
- **Stay Updated:** Keep the navigation and performance databases updated to ensure accuracy in flight planning and execution.
- **Monitor Continuously:** Actively monitor the FMC during flight to detect any discrepancies or required adjustments.
- **Consult the Manual:** Familiarize yourself with the FMC user manual for specific functionalities and troubleshooting tips.

Common Issues and Troubleshooting

Like any complex system, the FMC may encounter issues that require troubleshooting. Here are some common problems and their solutions:

1. Incorrect Position Data

- Symptoms: The FMC displays an incorrect aircraft position.
- Solution: Verify the GPS input and re-enter the current position if necessary.

2. Flight Plan Deviation

- Symptoms: The aircraft strays from the planned route.
- Solution: Check the active route in the FMC and ensure all waypoints and airways are correctly entered. Reselect the route if issues persist.

3. Database Errors

- Symptoms: The FMC displays a database error message.
- Solution: Verify that the navigation and performance databases are current. Reload the databases if outdated.

Conclusion

The Boeing 787 Flight Management Computer is an indispensable tool for modern aviation, providing pilots with the necessary capabilities to plan, navigate, and execute flights safely and efficiently. By understanding its functions, utilizing its advanced features, and following best practices, pilots can optimize their use of the FMC, ensuring a smooth flying experience. Ongoing training and familiarization with the system are essential to maintaining proficiency and enhancing operational effectiveness. As technology continues to evolve, staying informed about updates and improvements to the FMC will be crucial for all Boeing 787 operators.

Frequently Asked Questions

What is the primary function of the flight management computer (FMC) in the Boeing 787?

The primary function of the FMC in the Boeing 787 is to manage the aircraft's navigation and performance data, providing guidance for flight planning, route optimization, and autopilot control.

How does the Boeing 787 FMC integrate with other avionics systems?

The Boeing 787 FMC integrates with other avionics systems through a network of data buses, allowing it to receive real-time information from sensors, air traffic control, and other systems to enhance flight safety and efficiency.

What are the key features of the Boeing 787 flight management computer?

Key features of the Boeing 787 FMC include advanced route planning capabilities, performance calculations, automatic descent management, and the ability to interface with electronic flight bags (EFBs) for enhanced operational efficiency.

Can pilots customize the settings on the Boeing 787 FMC?

Yes, pilots can customize various settings on the Boeing 787 FMC, including preferences for navigation modes, display options, and performance parameters to suit specific flight conditions and operational requirements.

What troubleshooting steps should be taken if the FMC on a Boeing 787 malfunctions?

If the FMC on a Boeing 787 malfunctions, pilots should first consult the aircraft's Quick Reference Handbook (QRH) for troubleshooting procedures, check system status indicators, and, if necessary, revert to backup systems or coordinate with maintenance personnel for further assistance.

How does the Boeing 787 FMC enhance fuel efficiency during flight?

The Boeing 787 FMC enhances fuel efficiency by optimizing flight paths, calculating the most efficient altitudes and speeds, and adjusting routes based on real-time weather and air traffic conditions, thereby minimizing fuel consumption during flight.

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