



# Global Avionics Training Specialists, LLC

## EMBRAER ERJ-145 REGIONAL JET

### PRIMUS® 1000 INTEGRATED AVIONICS SYSTEM

#### LINE MAINTENANCE FAMILIARIZATION COURSE

#### SYLLABUS

#### I. INTRODUCTION

##### A. SYSTEM DESCRIPTION

The PRIMUS® 1000 Integrated Avionics System is a completely integrated flight director, autopilot, yaw damper and electronic display system. The flight director provides a full complement of vertical and lateral computed steering modes. Three-axis aircraft attitude stabilization and path control are provided by the autopilot for optimum performance throughout the aircraft's normal flight regime. The automatic path mode commands are generated by the IC-600 Integrated Avionics Computer (IAC), which integrates the attitude and heading reference, air data and flight deck display functions into a complete aircraft control system.

The PRIMUS® 1000 system employs two IC-600 Integrated Avionics Computers (IACs), one with autopilot capability, and one without. The IACs are interconnected with a serial digital data bus. This allows either pilot to couple their side flight director function to the single autopilot.

The Electronic Display System (EDS) is totally integrated in the processing of primary flight display data and flight director data. This level of integration greatly simplifies the interface requirements for the overall system. This level of integration also implies that if the EDS is operational, the flight director is operational. Conversely, if the EDS has failed, the flight director has also failed. This approach features all the performance advantages of display integration, flexibility, redundancy and reliability.

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The PRIMUS® 1000 Integrated Avionics System also has provisions for input/output (I/O) and data management with external radio communication and navigation systems through digital/serial data bus interfaces. The PRIMUS® 1000 Integrated Avionics System is derived from a combination of existing Honeywell systems.

The system displays heading, course, radio bearing, pitch and roll attitude, barometric altitude, selected alert altitude, radio altitude, course deviation, glide slope deviation, TO-FROM indications, and DME indications. Lighted annunciators denote selected flight mode, altitude alert, decision height, and go-around mode engagement. Pitch and roll steering commands developed by the IC-600 IAC in conjunction with the GC-550 Guidance Control Unit are displayed by steering pointers on the PFD, to enable the pilot to reach and/or maintain the desired flight path or attitude.

### **B. COURSE OBJECTIVES**

This course of instruction is designed to be supplemental to the line maintenance training provided by Embraer and/or their designated training provider. The material is presented in form and content to familiarize and prepare line maintenance avionic technicians to operate, maintain, troubleshoot and test the PRIMUS® 1000 Integrated Avionics System to the line replaceable unit (LRU) level. Equipment interface, theory of operation and flight operations are thoroughly discussed. Mode logic, signal flow, and ground maintenance testing are covered in detail.

### **C. ARRANGEMENT**

Based upon past experience, Global Avionics Training Specialists, LLC has arranged the course material in an order of presentation best suited to continuity and ease of comprehension.

### **D. DURATION**

The course is 5 days in length, 8 hours a day, for a total of 40 class hours.

### **E. STUDENT PREREQUISITES**

Students attending this course should be line maintenance technicians with a working knowledge of flight control, air data and flightdeck display systems.

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## II. COURSE CURRICULUM

### A. ORIENTATION

1. Welcome
2. Student registration
3. Course description
4. Class policies
5. Distribution of training materials
6. Location of facilities
7. Security

### B. SYSTEM DESCRIPTION

1. What is an autopilot?
2. What is a flight director?
3. System Flow Diagram
  - a. Electronic Display System
  - b. AHZ-800 Attitude and Heading Reference System and Laseref III/IV Inertial Reference System (IRS)
  - c. ADZ-850 Micro Air Data System
  - d. AA-300 Radio Altimeter System
  - e. Primus®-660/880 Weather Radar System
  - f. Primus® II Integrated Radio System
  - g. TCAS II Traffic Collision and Avoidance System
  - h. NZ-2000 Flight Management System
  - i. Global Positioning System
  - j. Flight Guidance System
  - k. LSZ-860 Lightning Sensor System
4. Component Locations
5. Digital Buses

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## C. SUBSYSTEM DESCRIPTION

1. Electronic Display System
  - a. Sub-system architecture
  - b. IC-600 Integrated Avionics Computer
  - c. DU-870 Display Unit
  - d. BL-870 Bezel Controller
  - e. BL-871 Bezel Controller
  - f. DC-550 Display Controller
  - g. GC-550 Guidance Control Unit
  - h. DA-800 Data Acquisition Units
  - i. Reversionary Control Panels (supplied by Embraer)
  - j. Fault Monitoring
  
2. AHZ-800 Attitude and Heading Reference System
  - a. AZ-800 Attitude Heading Reference Unit
  - b. Memory Module
  - c. FX-600 Flux Valve
  - d. Fault Monitoring
  
3. Laseref® III/IV Inertial Reference System
  - a. Inertial Measurement Unit (IMU)
  - b. Mode Select Unit (MSU)
  - c. Alignment
  - d. Fault Monitoring
  
4. ADZ-850 Micro Air Data System
  - a. AZ-850 Micro Air Data Computer
  - b. BL-870 PFD Bezel Controller
  - c. Fault Monitoring
  
5. AA-300 Radio Altimeter System
  - a. RT-300 Radio Altimeter Receiver Transmitter
  - b. Antennas (not Honeywell)
  - c. Fault Monitoring

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## C. Sub-System/LRU Descriptions (con't)

6. Primus® 660/880 Weather Radar System
  - a. Receiver/Transmitter/Antenna Unit
  - b. Weather Radar Controller
  - c. Modes of Operation
  - d. Weather Radar Displays
  - e. Fault Monitoring
  
7. Primus® II Integrated Radio System
  - a. RM-855 Radio Management Unit
  - b. CD-850 Clearance Delivery Control Head
  - c. AV-850A Audio Control Unit
  - d. RCZ-851 Integrated Communications Unit
  - e. RNZ-851 Integrated Navigation Unit
  - f. AT-860 ADF Combined Sense/Loop Antenna
  - g. Modes of Operation
  - h. Fault Monitoring
  
8. Traffic Alert and Collision Avoidance System (TCAS II)
  - a. RT-910 TCAS Computer
  - b. AT-910 Directional Antenna
  - c. Typical Bottom Omnidirectional Antenna
  - d. TCAS MFD Controls
  - e. TCAS RMU Controls
  - f. TCAS Displays
  - g. Fault Monitoring
  
9. Flight Management System
  - a. NZ-2000 Navigation Computer
  - b. IM-803 Configuration Module
  - c. CD-810 Control Display Unit
  - d. DL-900 Data Loader
  - e. Navigation Database
  - f. Custom Database
  - g. Configurations
  - h. Fault Monitoring

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10. Global Positioning System (GPS)
  - a. Global Positioning System Sensor Unit (GNSSU)
  - b. CD-810 Control Display Unit (part of NZ-2000 FMS)
  - c. GPS Antenna (not Honeywell)
  - d. Modes of Operation
  - e. Fault Monitoring
  
11. Flight Director System
  - a. IC-600 Integrated Avionics Computer (IAC)
  - b. GC-550 Guidance Control Unit
  - c. DC-550 Display Controller
  - d. PC-400 Autopilot Controller
  - e. Flight Director Lateral Modes of Operation
  - f. Flight Director Vertical Modes of Operation
  - g. Fault Monitoring
  
12. Autopilot/Yaw Damper System
  - a. IC-600 Integrated Avionics Computer (IAC)
  - b. GC-550 Guidance Control Unit
  - c. PC-400 Autopilot Controller
  - d. SM-200 Servo Drive and SB 201 Servo Bracket
  - e. Autopilot/Yaw Damper Engage Logic
  - f. Autopilot Modes of Operation
  - g. Roll Axis Servo Loop
  - h. Pitch Axis Servo Loop
  - i. Yaw Axis Servo Loop
  - j. Fault Monitoring

### **D. Integrated Maintenance Test (IMT) Procedures**