

# *ERJ 145*

## **AUTOFLIGHT**

**NOT FOR REAL WORLD USE!**



## **GENERAL**

The ERJ has a fully integrated three axes flight control system. The autoflight has two systems; Autopilot System and the Flight Guidance System. The FGS provides the input to the PFD to position the command bars that can be followed by the Autopilot or the pilot.

## **AUTOPILOT SYSTEM**

The Autopilot System includes the autopilot servos, three displays, AHRS, radios, ADCs and the radio altimeter.

## **FLIGHT DIRECTOR MODES**

### **General**

Flight Director mode selection is made by the Flight Guidance Controller. Annunciation of active modes is displayed on the PFD and on the selector buttons. These annunciations distinguish between armed and captured modes. The modes can be divided into lateral and vertical modes.

### **Lateral modes**

Lateral modes are related to heading or roll control.

### **Heading Hold mode**

This is the default flight director mode when no other lateral mode is selected. The heading hold mode is a roll command to maintain the current heading at the time of engagement.

A ROL label is displayed on the PFD.

### **Roll Hold mode**

Roll hold mode is initiated from hold mode by using the TCS button to fly the plane between 6 and 35 degrees bank angle (AP must be ON).

### **Turn Knob mode**

The turn knob allows the pilot to issue a roll attitude command using the Turn Control Knob. Moving the Turn Control Knob with AP engaged cancels all other lateral modes. When the Turn Control Knob is out of its detent the AP will maintain a roll attitude. When the

knob turned back to its neutral position the AP will switch back to heading mode. The turn submode is announced as ROL on the PFD and by the TN KNB when the Turn Control is out of detent.

### **Wings Level mode**

This mode provides a 0 degree roll command. This mode is active during Go Around Mode. The annunciation on the PFD is ROL.

### **Heading Select mode (HDG)**

The Heading Select mode commands the Flight Director to follow the track of the EHSI heading bug set by the Heading Select Knob. The HDG mode is selected by pressing the HDG button or arming the LOC, VOR, VAPP or BC modes. The HDG mode is prohibited in the following condition:

- Turn Control knob is out of detent and AP is ON

This mode is cancelled when:

- HDG button is pressed
- Changing the displayed heading source on the PFD
- LOC, VOR, VAPP and BC mode capture
- Engaging the Go Around mode
- Pressing the CPL button on the FGC

### **Low Bank mode**

The Low Bank mode allows the pilot to select limited bank angle for the heading mode from 27 degrees to 14 degrees by pressing the BNK mode on the FGC. The Low Bank Mode is automatically selected when climbing above 25,000 feet and cancelled while descending below 24,750 feet

### **VOR NAV mode (VOR)**

The VOR NAV mode allows automatic capture and tracking of VOR radials by pushing the NAV button on the FGC with VOR selected on the PFD. Selecting VOR NAV mode will automatically select HDG Select mode and arm VOR.

The mode will be cancelled by:

- Pressing the NAV button
- Selecting APR or HDG modes
- Changing the displayed NAV or heading source on the PFD
- Go Around mode
- Turn Control Knob is out of detent with AP ON

### **VOR Approach mode (VAPP)**

The VOR Approach mode has the same function as the VOR NAV mode with a higher gain for operation close to the station.

This mode is selected by pushing the APR button on the FGC with VOR displayed on the PFD

### **Localizer mode (LOC/BC)**

The localizer mode allows automatic capture and tracking of the localizer beam. Both front course (LOC) and back course (BC) are supported.

Selecting the LOC mode is done by pressing the NAV or the APR buttons and selecting ILS as a navigation source.

The mode will be cancelled by:

- Pressing the NAV or APR button
- Selecting HDG mode
- Changing the displayed NAV source on the PFD
- When the displayed NAV source is invalid for more than 5 seconds
- Pressing the Go Around button
- Turn Control Knob is out of detent with AP engaged

### **LNAV mode**

The LNAV mode allows the FD to capture and track the long-range navigation system's steering signal (FMS/GPS)

Selecting the LNAV mode is accomplished by pressing the NAV button with FMS selected on the PFD. Selecting LNAV will capture LNAV is the steering command is valid.

The mode will be cancelled by:

- Pressing the NAV button
- Selecting HDG mode
- Changing displayed NAV source on PFD
- Pressing the Go Around mode

## VERTICAL MODES

Vertical modes are those modes related to pitch control.

### **Pitch Hold Mode**

The Pitch control mode is the default mode when no other FD mode is selected

The Pitch Hold Mode synchronizes to the existing pitch attitude. By pressing the Touch Control Button the pilot can change the pitch attitude manually and when the button is released the system resynchronize to the new attitude.

The pitch attitude reference can be changed by rotating the Pitch Control Wheel if the AP is engaged and the FD is in Pitch Hold Mode.

### **Altitude Hold Mode (ALT)**

The ALT mode can be selected by pressing the ALT button.

The mode will be cancelled by:

- Pressing the ALT button
- Selecting VS, FLC or SPD modes
- Glide slope capture
- Pressing the Go Around button
- Pitch control wheel moved with AP on

### **Altitude Preselect Mode (ASEL)**

The ASEL mode makes the aircraft to climb or descend to a pre-set altitude then level off and maintain that.

Pilot can select ASEL mode by dialing a new altitude on the FGC and displayed on the PFD.

Pitch hold, speed hold, FLC mode or vertical speed hold must be used to change altitude toward the preselected altitude.

The mode will be cancelled by:

- Changing the preselected altitude
- Selecting ALT, VS, FLC or SDP modes
- Glide Slope capture
- Pressing the Go Around button

### **Flight Level Change Mode (FLC)**

The FLC mode means the airplane climb or descend in a pre-programmed speed or VS schedule

If the FLC mode is selected and the preselected altitude is higher than the current altitude the FD provides a speed command at preprogrammed climb speed schedule. If it's lower than the present altitude the FD commands the descend at a pre-programmed vertical speed. The FLC mode is engaged by pressing the FLC button.

The mode cancelled by:

- Pressing the FLC button
- Changing the preselected altitude
- Selecting ALT, VS, FLC or SPD modes
- Glide Slope capture
- Pressing the Go Around button

Descend schedule:

- 2000 ft/m to 10000 feet –1000 below

Climb speed schedule:

240kts below 10000 feet, 270 kits above until reaching M.56 then maintaining that speed until cruise altitude

### **Speed Hold Mode (SPD)**

The speed mode maintains airspeed or Mach number while flying to a new altitude. It is designed to provide overspeed and underspeed protections. Pilot can engage the mode by pressing the SPD button.

This mode cancelled by:

- Pressing the SPD button
- Selecting VS, ALT or FLC modes
- Glide Slope capture
- Pressing the Go Around button

### **Vertical Speed mode (VS)**

The VS mode is used to maintain preselected vertical speed.

The VS mode is selected by pressing the VS button and can be changed by turning the Speed Set Knob.

The mode will be cancelled by:

- Pressing the VS button
- Selecting ALT, SPD or FLC modes
- Preselected altitude capture
- Pressing the Go Around button

### **Go Around Mode**

Although commanding a nose up attitude this mode incorporates both lateral and vertical modes to maintain the wings leveled during engagement.

Select the Go Around Mode by pressing the red button on the side of the Throttle Controller