Lesson 3: *The full ILS approach*	**Fly This Lesson Now**

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Autopilot Fundamentals

The cockpit of the modern airplane has many useful things that can help you fly. No, I don't mean things like a copilot, either. I mean the autopilot. To a pilot, this is the most useful device in existence next to the coffee pot. And the day that an engineer develops an autopilot that makes coffee is the day that he or she will be raised to a god-like status. For now, these two devices are separate and we'll concentrate only on the autopilot in this lesson.

Autopilot Fundamentals

Using the autopilot features available with the Boeing 737–400 for the first few times you fly the aircraft may add to your early success at flying the airplane. There are three main components of the autopilot: the flight director, the autothrottle, and the autopilot. Let's examine each one individually.

Flight Director

The flight director helps guide you along the correct course. Unlike an autopilot that physically flies the plane for you, the flight director provides guidance for applying the correction required to get back on course. You are still flying the airplane; however, when the flight director is activated, the flight director appears on the attitude direction indicator (ADI) as a set bars, or crosshairs. The vertical bar shows deviations left or right of the intended course or centerline. The horizontal bar shows deviations above or below the target altitude or glide slope. In both cases, all you have to do is fly toward the bars to keep on the intended course.

To enable the flight director, switch on the **F/D ON** toggle switch located on the left edge of the **Mode Control Panel** (MCP). Once enabled, select the level of flight director guidance by clicking on the button relating to the desired mode of use (**NAV**, **HDG**, **APR**, and so forth).

Mode	Behavior
NAV	Tracks the VOR tuned in NAV1 and radial as set in **COURSE** window.
HDG	Tracks the heading bug determined by the heading dialed in the **HDG** window.
APR	Tracks the localizer and glide slope as tuned in **NAV1**.

Autopilot

The autopilot is the tool of choice when you want the airplane to fly itself. The autopilot provides the necessary automation to manage altitude, heading, and speed. Speed control is managed separate from heading and altitude via the auto throttle.

Autothrottles

To have the airplane manage its own speed, turn on the auto throttle by selecting the **A/T Arm** switch on the left side of the MCP. To set the desired airspeed, click the **IAS/MACH** window toward the center of the MCP and enter in the desired airspeed. Once you have set the desired speed in the window, click the **IAS** button (for speed relative to nautical miles per hour). To set the desired speed in relation to percent of speed of sound, click the **MACH** button and make sure the value displayed in the window matches the desired value (e.g., 0.75).

Enabling the Autopilot

With the simulation in or out of pause mode, set the desired values in the course, HDG, IAS, and Altitude windows. With the simulator out-of-pause, switch on the autopilot by clicking on the **A/P CMD** switch. To enable the autothrottle, click the **A/T ARM** switch on the left side of the MCP.

There you have it. Once you get a little practice at using this wonderful little device you'll have a tool that does many of the wonderful things that copilots do. Unfortunately, you can't send the autopilot out to get you a cup of coffee, but I understanding that the engineers are working on a solution to this problem as we speak.

To set the different modes of the autopilot

Item	Function	To Set
COURSE	Designates VOR radial or localizer course to fly. Value set in this window determines the CDI setting of the HSI.	Click the left side of window and decrease course heading. Click the right side of window to increase course heading.
	Tracking a VOR	

To fly off this value, click the **NAV** button below this window to track the VOR course. The VOR is determined by the frequency set in NAV1.

If your mouse is equipped with a wheel, rotate it forward to increase course, or rotate it back to decrease course.

Tracking a localizer
Click the **APR** button to track the localizer course corresponding to the value set in this window. Be sure the correct localizer frequency is set in NAV1.

HDG	Designates the magnetic heading to fly, and positions the heading bug of the HSI to this value. Click the left side of window and decrease course heading with left mouse button.	Click the right side of window to increase course heading.
		If your mouse is equipped with a wheel, rotate it forward to increase course or rotate it back to decrease course.
IAS/MACH	Sets the speed to fly according to the value set in the window.	Click the left side of window and decrease course heading with left mouse button. Click right side of window to increase course heading.
		If your mouse is equipped with a wheel, rotate it forward to increase course or rotate it back to decrease course.
ALTITUDE	Sets the altitude for level off.	Click the left side of window and decrease course heading. Click right side of window to increase course heading.
		If your mouse is equipped with a wheel, rotate it forward to increase course or rotate it back to decrease course.
VERT SPEED	Sets the rate of ascent (+) or descent (-) during altitude change.	Click the left side of window and decrease course heading. Click right side of window to increase course heading.
		If your mouse is equipped with a wheel, rotate it forward to increase course or rotate it back to decrease course.

Mode Selections

NAV	Tracks the VOR tuned in NAV1, and radial as set in **COURSE** window.
HDG	Tracks the heading bug on the heading dialed in the **HDG** window.
APR	Tracks the localizer and glide slope as tuned in NAV1.
IAS	Sets the target speed (in knots, indicated) for use with autothrottles enabled.
MACH	Sets the target speed (as a percentage of speed of sound) for use with autothrottles enabled.
ALT	Enables or disables altitude hold. Altitude maintained is determined by the value set in the **ALTITUDE** window.
BC	Enables back-course mode for tracking localizer back-course approaches.
LVL	Enables the wing leveler.
Y/D	Enables the yaw damper to smooth out unwanted yaw due to small inconsistencies between engine output.

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