

Flying the ILS Approach 6.0a

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IMPORTANT IN THIS SECTION:

- **It's illegal to fly an ILS with just the Skyway boxes. You must display data from an ILS receiver.**
- **“Loading the approach” does not access an ILS receiver; it only sets up the Skyway boxes and MFD.**
- **The Skyway boxes don't show ILS data, they show GPS data.** They do make it easier to fly the approach, *but only if the GPS is working!*
- **You have to use OBS / HSI:NAV to have legal ILS signals.**
- **You still have to check the ILS Morse ID.**
- **You have to enter the final approach course in degrees, magnetic.**
- **The HSI is not shown when it is decluttered OR there is no signal**

IMPORTANT FROM OTHER SECTIONS:

- When ATC changes your instructions (Section XXX-X)
- Missed approaches (Section XXX-X).
- Holding patterns (Section XXX-X).
- Procedure turns (Section XXX-X).
- Vectors to final and the Skyway boxes (Section XXX-X).
- Circling approaches (Section XXX-X).
- Flying approaches if you lose GPS – which means no Skyway boxes and MFD map (Section XXX-X).
- How to use the MFD (Section XXX-X) to know where you are on the approach. It won't replace your “mental model” of where you are on the approach, but if you get distracted or disoriented, the information is right there. Remember: *No GPS means no MFD map display.*

SIMILARITIES AND DIFFERENCES

- You can't use GPS signals to replace ILS signals – there are no “GPS-overlay ILS” approaches.
- The HSI-style lateral guidance in an ILS approach is also required for non-GPS / non-overlay approaches: ILS, localizer, SDF.
- **On an ILS approach, the HSI display is required.** On a GPS / overlay approach, it only repeats the Skyway box data.

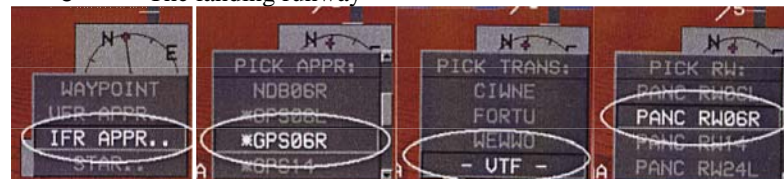
RECENT SOFTWARE CHANGES IN 6.0A:

- CDI symbology at bottom of all screens (??)
- Annunciations in lower left corner of all screens (??)

STEP BY STEP -- SETTING UP THE EFIS FOR AN ILS APPROACH WITH A FLIGHT PLAN OR ACTIVE WAYPOINT IN USE

The two major items are setting up the Skyway boxes and MFD; and tuning the ILS receiver and displaying that ILS information on the EFIS.

1. Ensure the landing airport is the active waypoint, either from the active flight plan, Direct-To (Section XXX-X) or **NRST** (Section XXX-X).
2. Press the **ACTV** bezel button. Next, by turning the control knob to select and then pushing to enter, select:
 - The destination airport (not shown in picture sequence below)
 - **IFR APPR...** (IFR approach)
 - The published approach procedure
 - The published transition or vectors to final (Section XXX-X).
 - The landing runway



3. Tune and identify the ILS on your VHF NAV radio.
4. Choose which ILS receiver to display on the HSI:
 - Press the **OBS** bezel button
 - Press button for **HSI: NAV1** or **HSI: NAV2**, whichever one has the ILS tuned and identified.
 - (The currently selected HSI button has an asterisk. In the picture, it is NAV1*.)
 - You can “hide” the HSI permanently (Section XXX-X), but you can't choose no HSI. *Why?*
 - The only way to display VHF navigation data is with the HSI.



5. Enter the ILS course manually (in degrees, magnetic)
 - o Press the **OBS** bezel button again
 - o Turn the control knob until the desired course is displayed in the bottom, center of the screen
 - o Push the control knob in to enter that OBS setting.



6. Check settings at the bottom of the PFD. In this example:
 - o The CDI is the legal, localizer presentation. It does not depend on the course entered.
 - o **NAV:VLOC1** means that VOR/LOC 1 is displayed.
 - o **ANG**ular data is shown (degrees), not cross-track (**NM**).
 - o *On a GPS approach, NM will be displayed early in the approach, but ANGular will be displayed approaching the FAF and until the MAP.*
 - o Course is correct (208 degrees for this example)
 - o **HDG:** (heading) is Highway In The Sky
7. Recommended – Passing the FAF, zoom in on the PFD for more prominent terrain in the synthetic vision, and larger Skyway boxes and HSI.
 - o On the PFD, not on an MFD, press the **MENU** bezel button
 - o Then press the **ZOOM ON** button on the right hand side.



STEP BY STEP -- SETTING UP THE EFIS FOR AN ILS APPROACH WITH A FLIGHT PLAN OR ACTIVE WAYPOINT IN USE

Note: this method does not allow you to program a circling approach.

1. Press the NRST (nearest) bezel button
2. Select “ILS” by turning the control knob and then pushing the control knob.
3. Turn the control knob to select the desired ILS. *See next step before pushing the control knob!*
4. Optional, some installations only – Load the ILS frequency into the nav receiver standby frequency by pressing the NRST bezel button, then the TO NAV1 or TO NAV2 button. *You still must check the LOC Morse ID.*
5. Finish selecting the correct ILS by pushing the control knob
6. Push the control knob again to CONFIRM ACTIVATE ILS. (**EXIT** will cancel selecting the ILS).

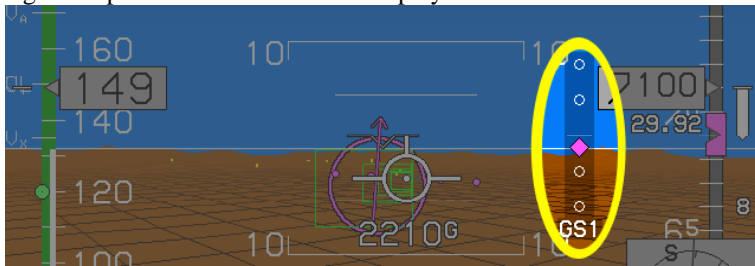
Questions to ask the customer:

- When you're on an ILS after entering it with NRST, and then do a heading override, if you push FPL – expecting to edit the flight plan – instead, it cancels the heading. ???
- If you do INFO, it defaults to TAKLE – which is active. Nice. But select TAKLE, and you don't get the crossing altitude, even though it's the active waypoint.
- HITS ARM – that means fly the HITS, not just display HITS. Why is it labeled ARM?
- Why do we have both HITS and Skyway boxes? Why not one term?
- What turns on the ILS? Showing NAV:VLOC1, and HSI:NAV1, but no needles displayed.
- SUSPEND – how to kill? And if you're inside the FAF and discover the error, then what? You can't arm it – is that required by the regs?
- SUSPEND (HLD) / (OBS) / (MAP) / (HDG)
- When you activate a flight plan, after it takes (with no cue), you then have to EXIT to EFIS

READING THE ILS DISPLAYS

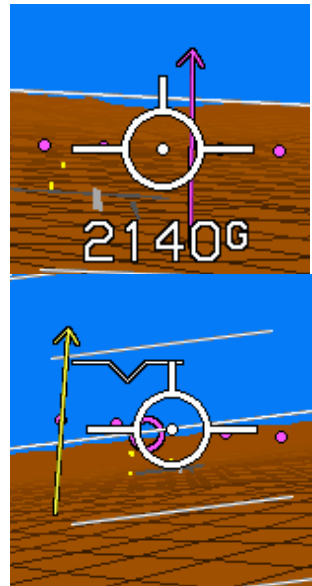
The glideslope display uses a magenta diamond instead of a needle, but works just the same as a glideslope needle.

- It's a "fly-to" display, like a regular ILS needle – if the diamond goes up, you fly up to the diamond. If the diamond goes down, you fly down to the diamond – just like flying through the Skyway boxes.
- If the glideslope signal is not usable, instead of an "Off" flag showing, no glideslope indicator will be displayed.
- If the HSI is not shown because it is decluttered (Section XXX-X), the glideslope indicator will still be displayed.



The localizer has a few extras:

- The center of the localizer course is indicated by the Flight Path marker or the "ghost" marker (Section XXX-X).
- With the localizer needle within one dot of center, the dots disappear, to "declutter" the display, but the Flight Path Marker still shows on course.
- More than two dots off course, the localizer needle is yellow, not magenta. (Lower Picture)
- If the localizer signal is unusable, the needle is not displayed – just as when the HSI is decluttered.
- (When the signal is from a VOR, the "to flag" is a white dot at the head of the arrow – and a "from flag" is a white dot at the tail of the arrow. No to/from flag is shown on localizer, SDF, or GPS signals.)



Because the HSI needle rotates, you have to input the final approach course in degrees, magnetic, so the needle can be read correctly. If the final approach course entered is wrong, the tilt of the needle will be wrong – and the left/right sensing could even be backwards!

You'll recognize the left/right needle as the moving portion of the HSI needle. When you press the OBS bezel button, the HSI:NAV1 and other selection options start with "HSI:" because this display is so much like a conventional HSI.

FLYING THE APPROACH

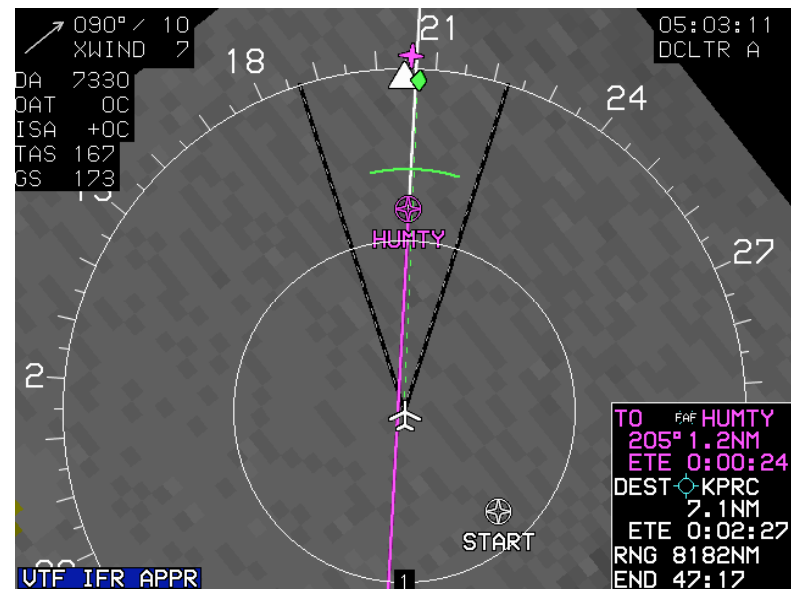
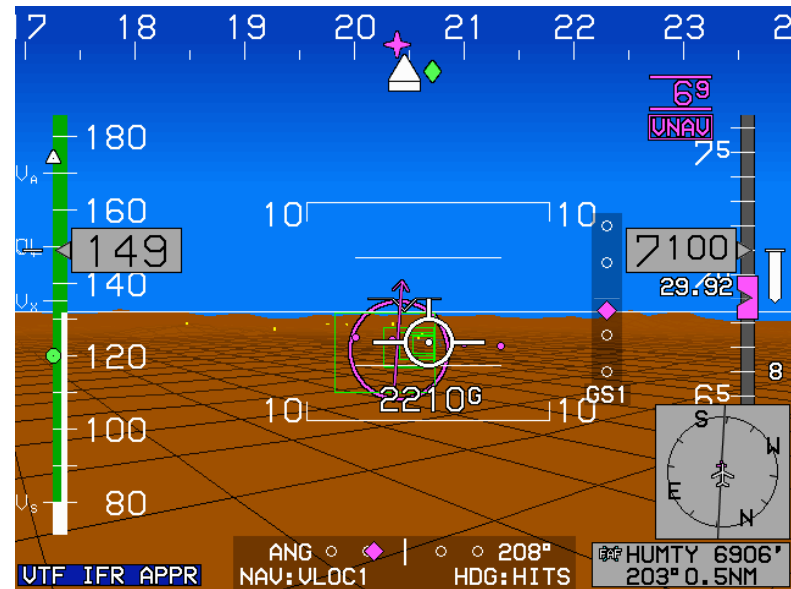
FARs require that the localizer and glideslope information be used as primary reference during an ILS approach. That's easy -- *fly through whatever part of the Skyway boxes will center the localizer and glideslope needles* – such as a corner or an edge of the Skyway boxes, instead of the middle of the Skyway boxes – whatever will center the ILS. Or, hide the Skyway boxes and fly just localizer and glideslope information – and if someday GPS data is unavailable, you might have to. *Need a picture of the ILS needles centered while flying off center through the Skyway boxes.*

In the lower right corner of all displays, you'll see the active waypoint. In this example, the FAF is HUMTY, the crossing altitude is 6,906' MSL, and HUMTY is a half mile away at 203.0 degrees. The FAF, HUMTY, is the active waypoint so it appears on the PFD as a magenta fly-through circle.



GRADUATION PROFICIENCY

- Integrate EFIS operation into normal cockpit flow and chores: review the approach plate and all relevant charts; configure the cockpit and perform appropriate checklists and flows; enable marker beacon audio.
- Know everything about flying missed approach, circling approach, STARs, vectors to final, procedure turn, holding pattern, last minute runway changes (*not in there yet!*), and handling ATC instruction changes outside the FAF.
- Make the designation airport the active waypoint (Section XXX-X).
- Select **IFR APPR...**, the specific ILS approach, the transition, and the runway.
- Tune and identify the ILS on your VHF nav radio.
- Enable ILS guidance display: Press the **OBS** bezel button, then select the VHF source to display on the HSI.
- Confirm your selection at the bottom of any screen.
- Set the ILS course manually (in degrees, magnetic) by pressing the **OBS** bezel button and using the control knob.
- Alternatively, enter the ILS course from the database by pushing the **NRST** (nearest) bezel button, use the control knob to select the correct ILS approach and push **CRS SYNC** (course synchronize) on the left side of the PFD.
- Confirm the localizer and glideslope symbology.
- Maintain situational awareness with the MFD.
- Set autopilot approach mode before glideslope intercept.
- Recommended: passing the FAF inbound, zoom in the display for better terrain awareness and focus on approach precision (Section XXX-X). Do this on the PFD by pressing the **MENU** bezel button, then the **ZOOM ON** button on the right hand side.



GOALS OF THIS MANUAL:

- Make this a manual that customers will actually read
- As much as possible, a customer should be able to start reading at the start of any section and the manual will make sense – because the reader may open to any section for clarification of details.
- Appeal to all levels of user experience
- Appeal to multiple learning styles
- If anything is left out of the manual, such as common themes or similarities, you are inviting the reader to generate their own, possibly false, rules of thumb.
- Make the manual consonant with the training video, the classroom instruction, the in-flight instruction, and the marketing collateral.

Style Guide (draft)

- Engraved bezel buttons are always “bezel buttons”
- Soft-labeled buttons are “buttons” – soft key? Soft button? Gray button?
- Buttons are always “pressed”
- The control knob is “pushed”
- Never use “enter” or “set” without an explanation of how to do it, using words like turn, press, or push – so new users are never left behind.
- Screen shots should always show enough detail to let the user know where the feature is. That detail can be a complete edge, a corner, the horizon, the flight path marker, or the airspeed or altimeter tape.
- Screen shots showing a feature should have that feature circled in a color not used elsewhere on the screen, with everything outside that circle dimmed. Better, those circles should be a color never used on the display – such as orange.
- Screen shots will be free from extraneous detail, such as radio altitude readouts, irrelevant fly-through hoops, etc.

Bugs / Suggestions / I don't understand why

- Why doesn't the PFD annunciate ILS somewhere? and which approach? Maybe, “KPRC VTF ILS21L”
- When “SUSPEND” is annunciated, how do you get rid of it? Couldn't it say why the suspend, like “SUSPEND (HDG)” or “SUSPEND (HLD)” or “SUSPEND (MAP)” or “SUSPEND (FAF)” something like that?
- Why does it let you select an ILS and proceed past the FAF with no ILS guidance selected?
- If you're inside the FAF, can you still select the HSI? I couldn't make it work. It may be procedural that you can't go inside the FAF without the ILS, but in an emergency, should the box prohibit you from getting what you need?
- EXIT should be renamed ABORT, REVERT, CANCEL, EVERYTHINGBACKTHEWAYITWAS, FUHGEDDABOUTIT. Does it work everywhere, like for HSI?
- When you pass the FAF and the missed approach button shows, is that menu lock?
- GPS course has Manual and Auto – but for VHF, it's Auto or nothing
- HSI declutter and no signal both give the same symptom