

# KAP 140 - Instructor Notes



## Important Things to Remember AT ALL TIMES

1. Just as when we're flying with another pilot there must NEVER be any doubt about who/what is flying the plane. There can be only one manipulator of the controls, and if it's the autopilot then HANDS OFF the controls.
2. If you insist on flying the plane while the autopilot thinks it is flying the plane it will fight you, it will trim the aircraft against your inputs and when either you give up and turn off the autopilot or the autopilot gives up and disconnects itself you risk have a severely out of trim aircraft to practice your unusual attitude recovery on.
3. It's VERY unlikely that you have auto-throttles, so even when the autopilot is flying you are responsible for the application of the appropriate power setting. Get used to using 3 standard power settings, determine what they are and stick with them:
  - a. Level Flight - you may have multiple settings for various airspeeds, but know your target airspeed and when the autopilot is holding altitude, set that power.
  - b. Descent - best practice is a 500fpm descent - know the power setting for that.
  - c. Climb - often this is full power at 500fpm and accept the speed, but figure out what your settings are and consistently use them.
  - d. Other - you may have other settings and autopilot modes you want to use, but determine them in advance and use them religiously. Making it up on the fly is a recipe for the next question being "what's it doing?"
4. YOU CAN ALWAYS TURN IT OFF - you are a well-trained, current and proficient pilot. If you don't like or understand what the autopilot is doing TURN IT OFF, sort everything out hand flying and reconnect the autopilot (if you like).

## Videos and Articles

A very basic tutorial - does not include coupled approaches:

<https://www.youtube.com/watch?v=O6MfB7S1zr4>

A video of a powerpoint presentation:

[http://www.powershow.com/view/1befc3-ZWI4M/KAP\\_140\\_Autopilot\\_powerpoint\\_ppt\\_presentation](http://www.powershow.com/view/1befc3-ZWI4M/KAP_140_Autopilot_powerpoint_ppt_presentation)

There are a multitude of other videos, feel free to search for ones that speak to you.

An article from boldmethod on “10 Tips for Flying With An Autopilot in IMC”, but still good reading for VFR pilots:

<https://www.boldmethod.com/blog/lists/2023/03/10-tips-for-autopilot-flying-in-imc/>

A good article on general auto-pilot usage:

<https://www.aviationsafetymagazine.com/aircraft/autopilot-building-blocks/>

## G5 Electronic Flight Instrument Pilot’s Guide for Certified Aircraft

Under Section 4 Additional Features (Page 73) there is a description of the G5 interface via GAD 29B that allows the G5 to provide input to a third party autopilot. In our case the KAP 140. The section provides a good description of how the interface works.

### GPSS

GPSS (GPS Steering) is a mode on the G5 HSI that allows the GPS, through the G5 and the GAD 29B interface, to provide steering commands to the auto-pilot. For this to work the auto-pilot **must be in HDG mode** (this is counter-intuitive).

In GPSS mode the auto-pilot will NOT follow the GS on a coupled approach.

# Flying Approaches

Vectors to final:

1. GPSS on and autopilot in HDG and ALT until you're on vectors
2. Once you get a vector, turn GPSS off to fly the bug. Autopilot will still be in HDG ALT.
3. After you get your approach clearance (ie, you're on the final vector to intercept), hit APR to arm approach mode. Display will say "HDG", "APR ARM", and "ALT"
4. The autopilot will intercept the final approach course automatically, at which point the display will say "APR ALT" and "GS ARM".
5. The autopilot will capture the glideslope automatically, at which point it'll say "APR GS".

T approach (RNAV LPV):

1. GPSS on and autopilot in HDG and ALT. This time, leave GPSS on for the moment since you're not on vectors.
  2. After you cross the IAF, the autopilot will turn to fly the base leg automatically. Autopilot still in HDG ALT and GPSS on.
  3. Approaching the IF, the GPSS will give you a perfect turn onto the final approach course for the intermediate leg. Autopilot still in HDG ALT and GPSS on.
  4. After the autopilot has completed the turn onto the FAC and you're established on the intermediate leg, hit APR and turn GPSS off. Display should go straight to APR ALT and GS ARM.
  5. The autopilot will capture the glideslope automatically and switch to APR GS.
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NOTE: The rest of the document is provided for historical perspective and/or for those people not G5 (or equivalent) equipped.

## Quirks of the Heading, ROL and Intercept Function

This quirk appears when using the KAP 140 with a DG. The current trend is to replace DGs with advanced instruments such as a G5 - which will operate in HSI mode and make this issue moot.

### GPS Intercept

- Press the HDG button to put the A/P in ROL mode
  - This is called “all heading intercept”
- Press NAV - and NAV ARM is annunciated on line 2
  - ROL changes to HDG and flashes for 5 seconds the ROL is re-displayed
- While HDG is flashing move the heading bug to desired course
  - Aircraft remains wings level until capture point

### Procedure Turn - ILS

Assumes we're going to use BC tracking on the outbound

- Set the FRONT course on the OBS and REV
  - HDG annunciator will flash for 5 seconds and then extinguish
- While HDG is flashing move the heading bug to the FRONT course
  - Since HDG was active upon selection of REV the A/P will initiate a 45 degree intercept to the localizer
  - This means the aircraft may make a turn you weren't expecting
  - If you don't want that do a “all heading intercept” as described above
- Upon intercept REV will be annunciated
- At the desired point press HDG and use the heading bug to turn
- Turn inbound on the PT with the HDG bug
- Press APR to arm approach mode - APR ARM will annunciate
  - The HDG annunciator will flash for 5 seconds
- While the HDG annunciator is flashing set the heading bug to the inbound course
- GS mode will automatically arm - GS ARM
- With glideslope capture GS annunciates
- ALWAYS INITIATE THE MISSED APPROACH BY HAND
  - Establish the parameters for the missed approach and re-engage the autopilot if desired.

## Procedure Turn - GPS

- Use APR mode approaching the IAF - APR ARM
- Upon Waypoint Alert
  - Set the heading bug to the outbound course
  - Switch the GPS to OBS mode
  - Set the OBS to outbound course
- Use HDG mode and the heading bug to fly the procedure turn
- Inbound on the Procedure turn
  - Switch the GPS to LEG mode
  - Set the OBS to the inbound course
  - Press APR to arm approach mode - APR ARM
  - HDG annunciator will flash for 5 seconds - move the heading bug to inbound course
- Descent is controlled by Pressing ALT to enter VS mode
  - Set descent rates
  - Press ALT to level off