KAP 140 Autopilot

A self-study tool for pilots who fly with the Bendix/King KAP 140 Autopilot System

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to everyone who desires to use it.

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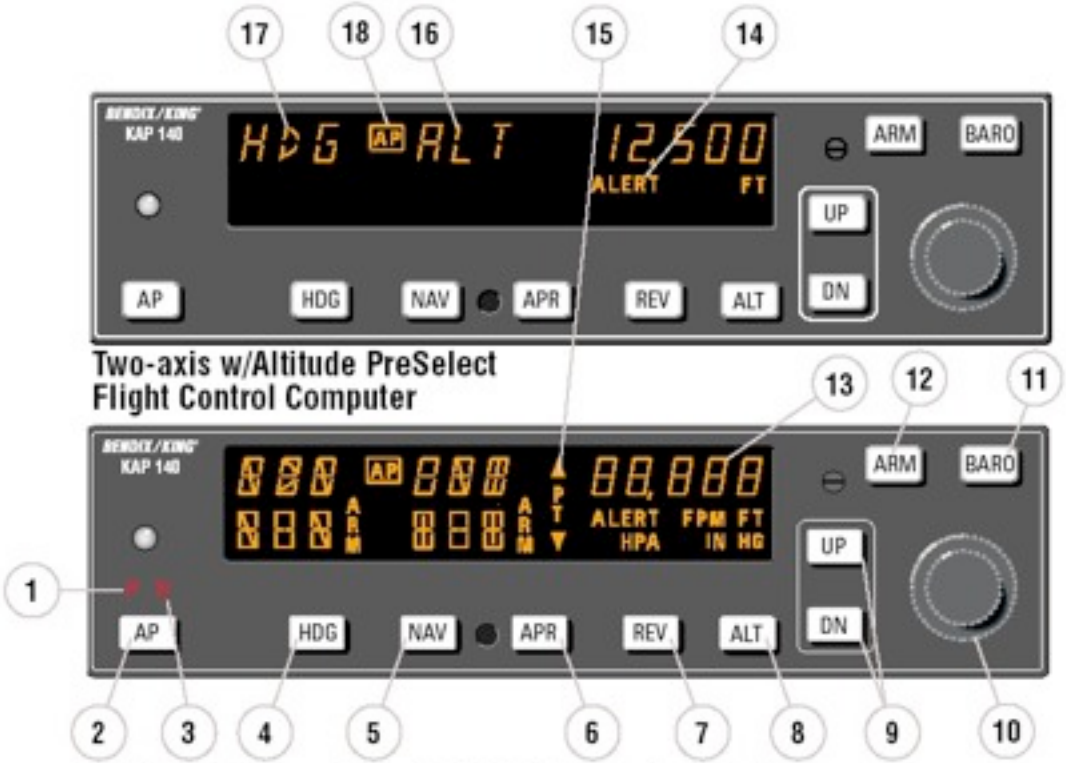
Three Different KAP 140 Autopilots

The KAP 140 **Single Axis** system is an entry level digital panel-mount autopilot, offering lateral modes only with an electric trim option.

The KAP 140 **Two Axis** system provides both lateral and vertical modes.

The KAP 140 **Two Axis** system provides both lateral and vertical modes **with altitude preselect**.

Learning the Two Axis/Altitude Preselect KAP 140



Full KAP 140 Two-Axis with Altitude Preselect Display

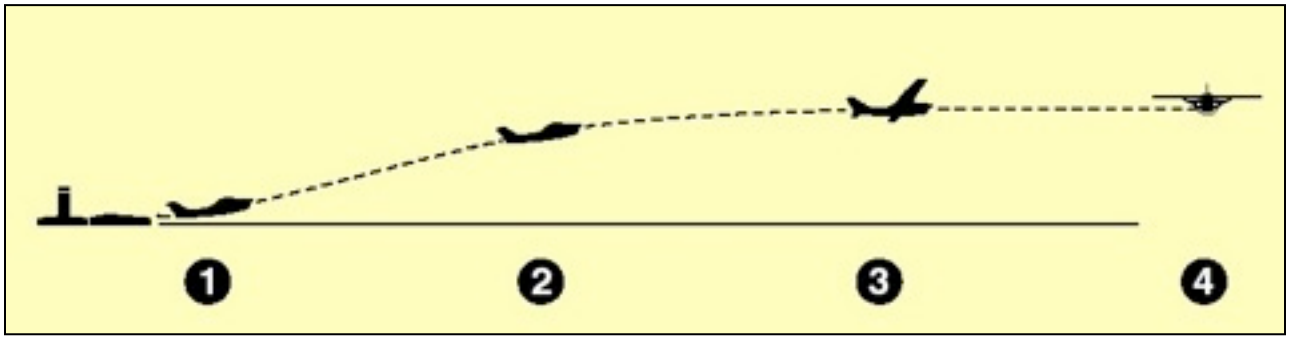
1. PITCH AXIS, (P) ANNUNCIATOR
2. AUTOPILOT ENGAGE/DISENGAGE (AP) BUTTON
3. ROLL AXIS (R) ANNUNCIATOR
4. HEADING (HDG) MODE SELECTOR BUTTON
5. NAVIGATION (NAV) MODE SELECTOR BUTTON
6. APPROACH (APR) MODE SELECTOR BUTTON
7. BACK COURSE APPROACH (REV) MODE SELECTOR BUTTON
8. ALTITUDE HOLD (ALT) MODE SELECT BUTTON
9. VERTICAL TRIM (UP/DN) BUTTONS
10. ROTARY KNOBS
11. BARO SET (BARO) BUTTON
12. ALTITUDE ARM (ARM) BUTTON
13. ALTITUDE ALERTER/VERTICAL SPEED/BARO SETTING DISPLAY
14. ALTITUDE ALERT (ALERT) ANNUNCIATION
15. PITCH TRIM (PT) ANNUNCIATION
16. PITCH MODE DISPLAY
17. ROLL MODE DISPLAY
18. AUTOPILOT ENGAGED (AP) ANNUNCIATION

Reading the Display

When reading the autopilot display, it is important to differentiate between the information on the top versus the bottom of the screen. The information on the top shows the modes that are currently active. The information on the bottom shows what is going to happen in the future. In this example, the autopilot is in HDG and VS modes and the ALT mode is armed to capture 7,000 feet. <u>If the ALT mode is not armed, the autopilot will not capture the selected altitude.</u>

Scenario Index

Scenario 1 - Takeoff and Climb to Assigned Altitude (1)



OR

1. The aircraft is well off the ground and established at a safe climb rate.
The heading bug on the DG or HSI is turned to the desired heading of 080° (runway heading).
By depressing the **HDG** button on the KAP 140, the autopilot engages into the heading and vertical speed modes and maintains the selected heading of 080° and current rate of climb.

*Note: On newer models, you must press and hold the **AP** button for 0.25 seconds to engage the autopilot.*

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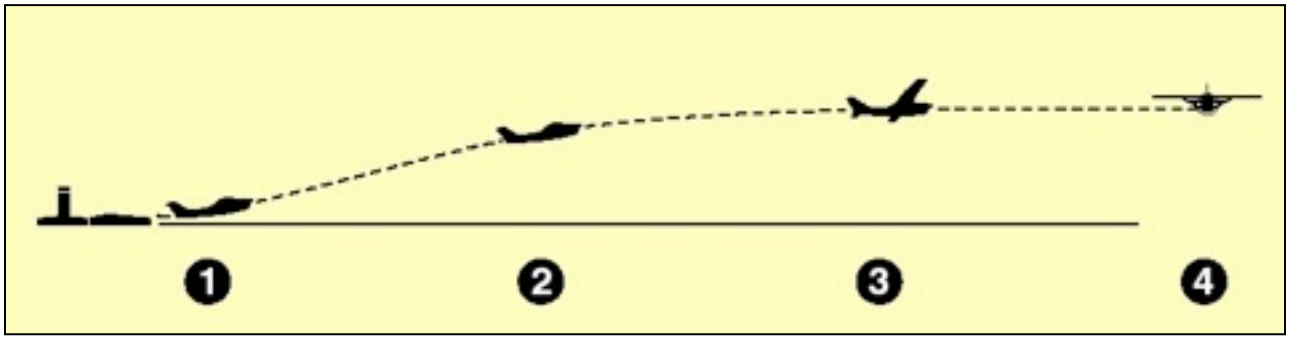
Scenario 1 - Takeoff and Climb to Assigned Altitude (2)



OR

2. The heading bug on the DG or HSI is turned to the new desired heading of 010° and the aircraft begins to respond with an immediate left turn. A cruise altitude of 7,000 feet is entered using the rotary knobs. The **ARM** button must be pressed to manually engage the altitude capture function. The altitude ARM annunciation is displayed at the bottom of the screen. ALT will automatically arm for subsequent altitude changes.

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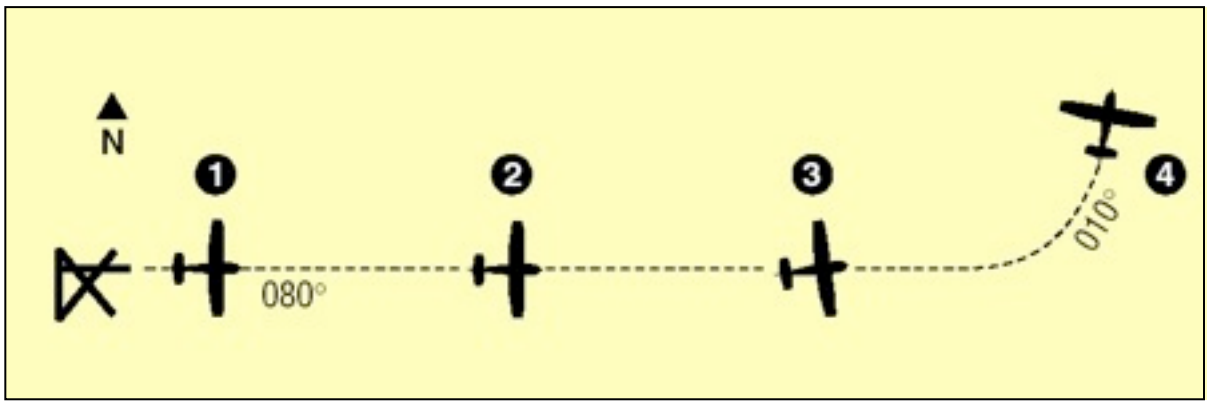
Scenario 1 - Takeoff and Climb to Assigned Altitude (3)

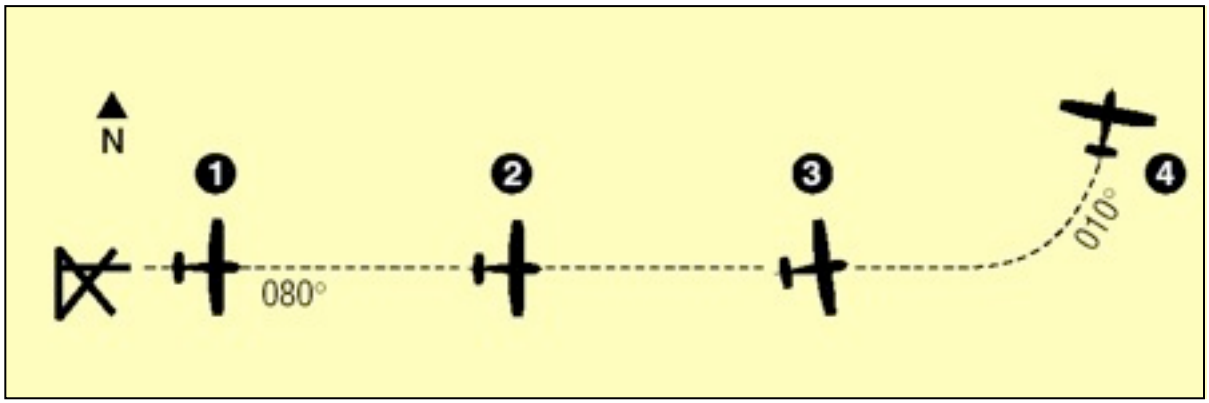


OR

3. The autopilot is responding to the heading select mode with a left bank. The climb rate has been decreased, using the **DN** button, in preparation for level out. The vertical speed value will be displayed upon selection of the **DN** button and will remain for three seconds.

Click HERE to return to the scenario index

Scenario 1 - Takeoff and Climb to Assigned Altitude (4)



OR

4. Desired altitude has been reached and automatic altitude capture occurs. The autopilot has completed the turn and is now established on a 010° heading.

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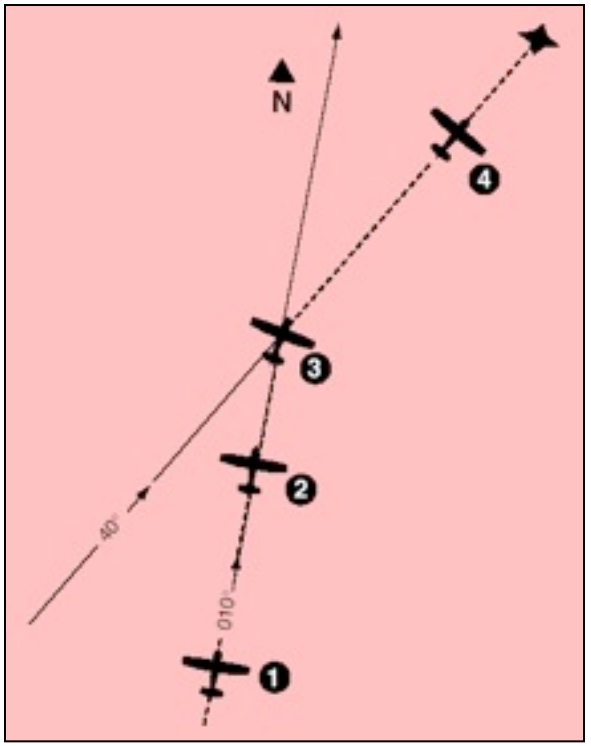
Scenario 2 - GPS Capture (1)



1. Continuing on heading 010°, a GPS waypoint is established. A 30° intercept is desired.

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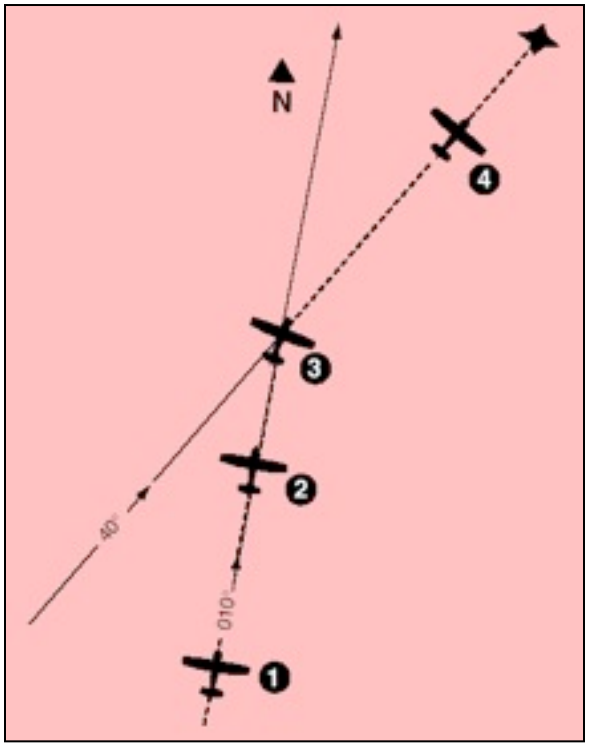
Scenario 2 - GPS Capture (2)



2. The **HDG** button is depressed to select ROL mode which will allow an “all angle intercept”. GPS data is selected for the CDI and the OBS is set to 040°. The **NAV** button is depressed and NAV ARM is annunciated. ROL will change to HDG and flash for five seconds. ROL will then be redisplayed. While the HDG annunciation is flashing, move the heading bug to the desired course of 040°. The aircraft will remain wings level until the capture point.

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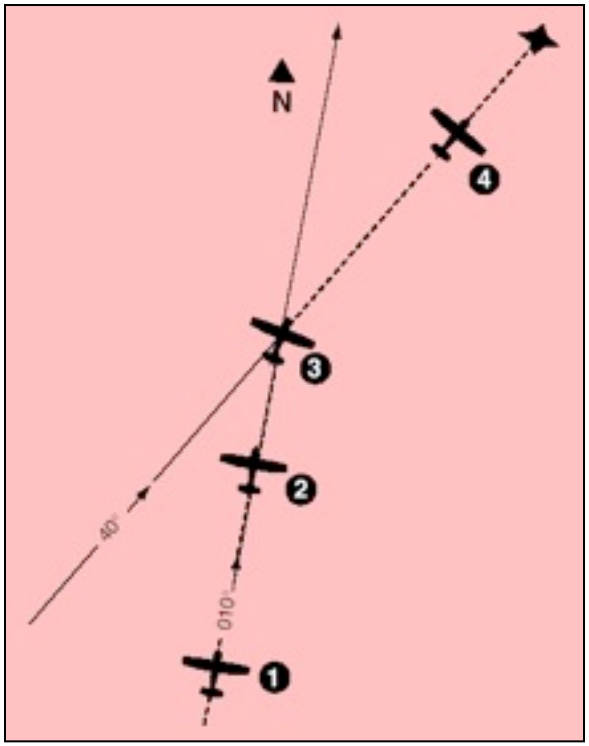
Scenario 2 - GPS Capture (3)



3. When the computed capture point is reached, the ROL annunciation changes to NAV and a right turn is initiated by the autopilot.

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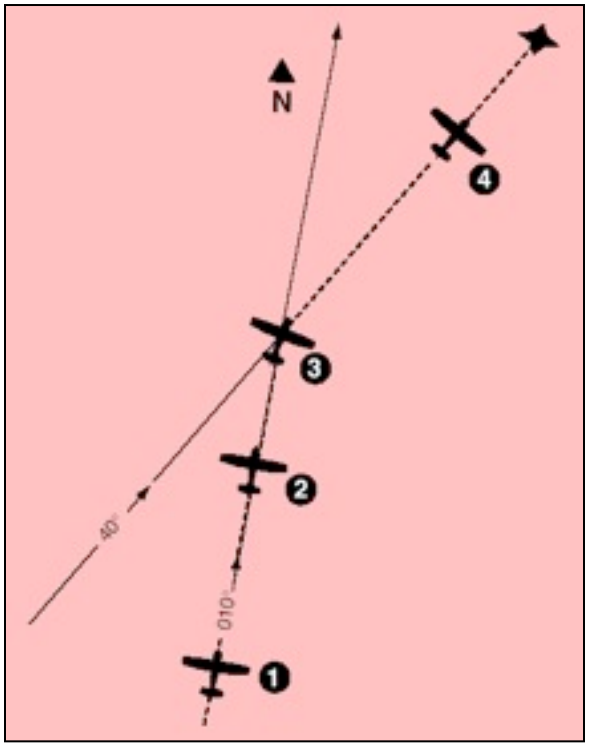
Scenario 2 - GPS Capture (4)



4. The turn is complete and the autopilot is tracking the GPS course.

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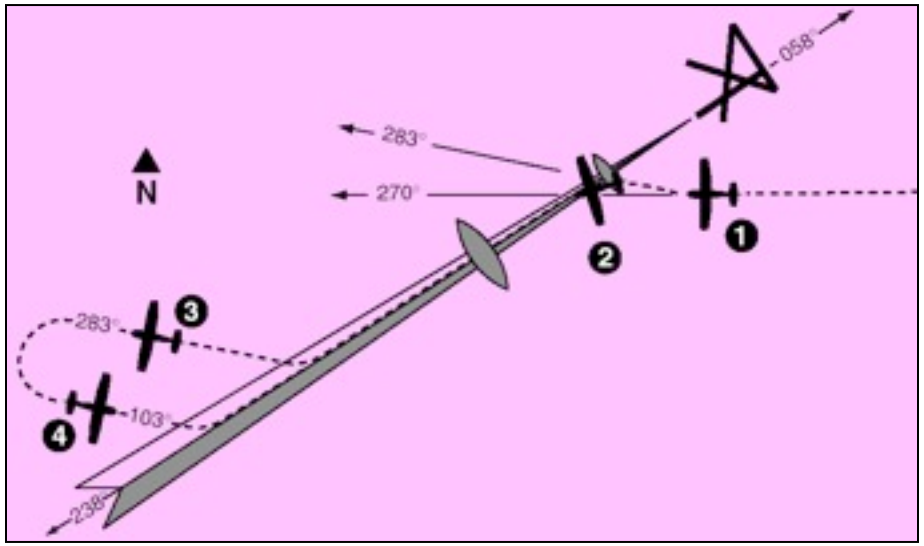
Scenario 3
Procedure Turn to ILS Approach (1)



1. The aircraft is heading 270° with heading and altitude hold engaged. To intercept and fly the ILS front course outbound, set the front course on the OBS and depress the reverse course (**REV**) button. The HDG annunciation will flash for five seconds then extinguish. While the HDG annunciation is flashing, move the heading bug to the front course 058°. Since HDG was active upon selection of REV the autopilot will initiate a 45° intercept to the localizer signal. In this case, the aircraft will turn to 283°.

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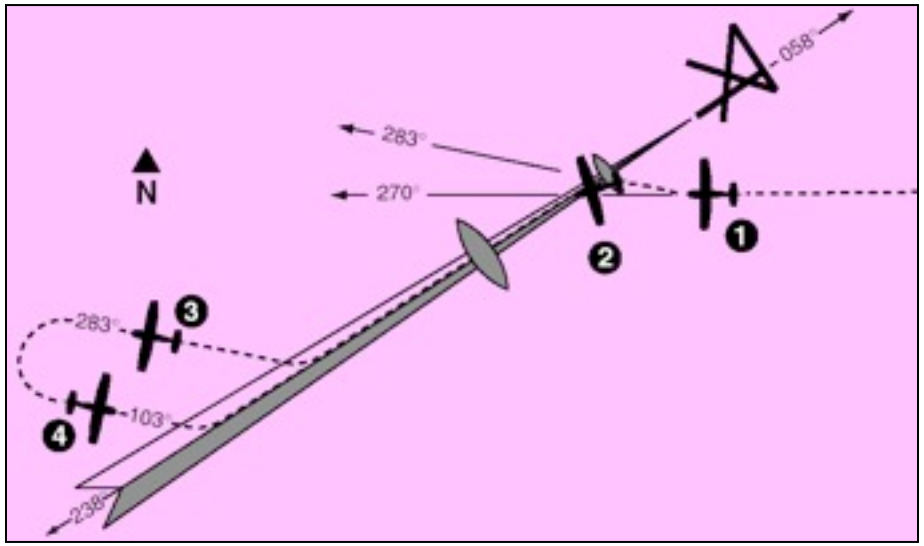
Scenario 3
Procedure Turn to ILS Approach (2)



2. When the computed capture point is reached, auto intercept mode is cancelled and reverse localizer mode is automatically activated and a left turn outbound on the localizer is initiated by the autopilot.

Note: The left-right deviations of the CDI course deviation needle are reversed (you must turn right to center a deviation of the index to the left). This needle reversing takes place because you are flying outbound on a front course.

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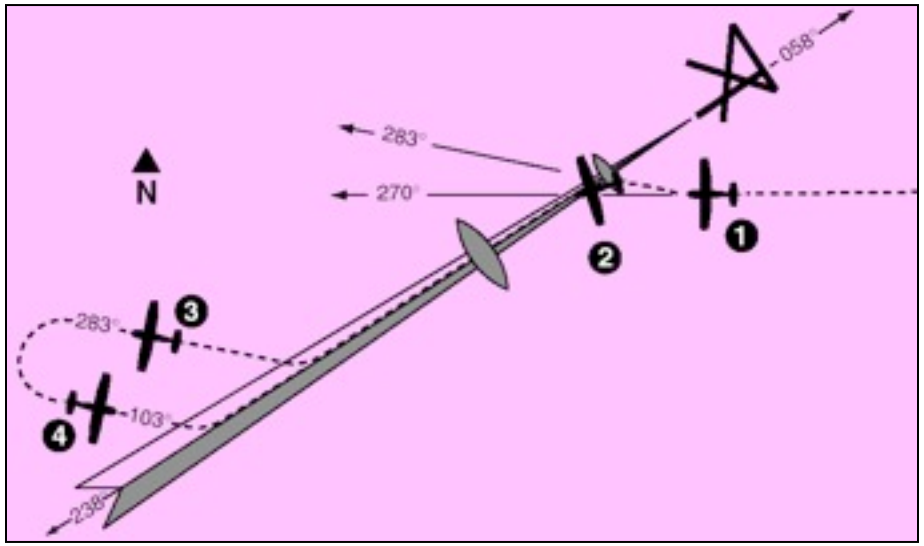
Scenario 3
Procedure Turn to ILS Approach (3)



3. At the desired point, HDG mode is used to initiate the procedure turn. Select HDG and set the heading bug to 283°. During the procedure turn outbound, the CDI course index goes off scale to the right. The aircraft is flying away from the localizer centerline at a 45° angle on a selected heading of 283°.

Check the heading displayed on the DG against the magnetic compass and reset if necessary.

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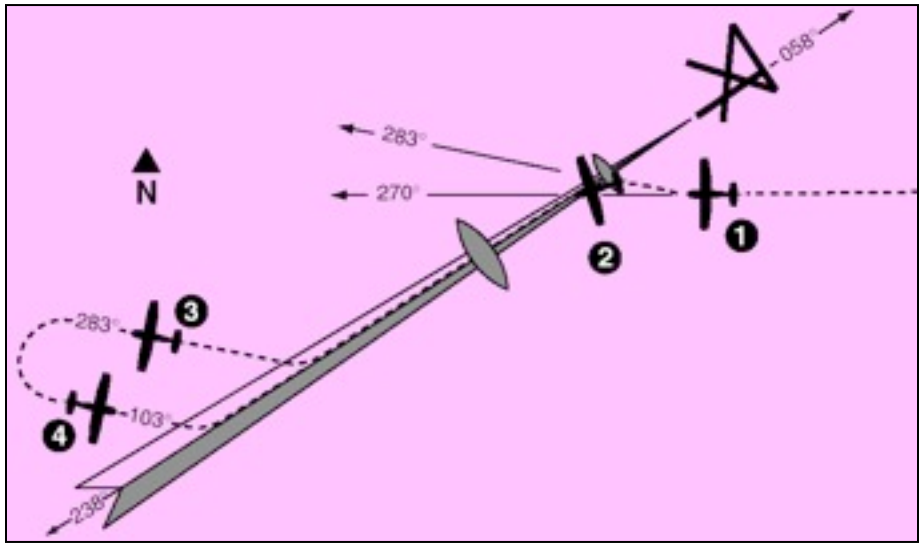
Scenario 3
Procedure Turn to ILS Approach (4)



4. Now you have reset the heading bug to 103° and made a 180° turn to this heading. This 103° heading will intercept the front course of 058°. <u>You must now select the approach mode by depressing the **APR** button on the KAP 140.</u>
* The HDG annunciation will flash for five seconds then extinguish. While the HDG annunciator is flashing, move the heading bug to the front course 058°. Since the 45° intercept is 103°, the aircraft will not turn until the front course is captured.

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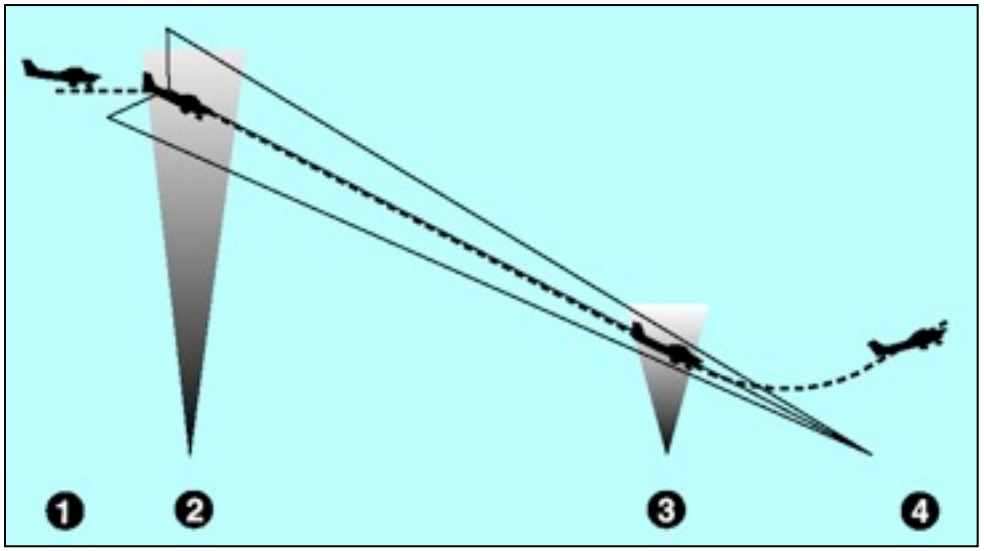
Scenario 4
Front Course
ILS Approach (1)



1. Continuing the maneuver from scenario 3, APR coupling occurs (**HDG** annunciation changes to **APR**), and the glideslope mode is automatically armed. The autopilot will capture the localizer and the CDI course index will center.

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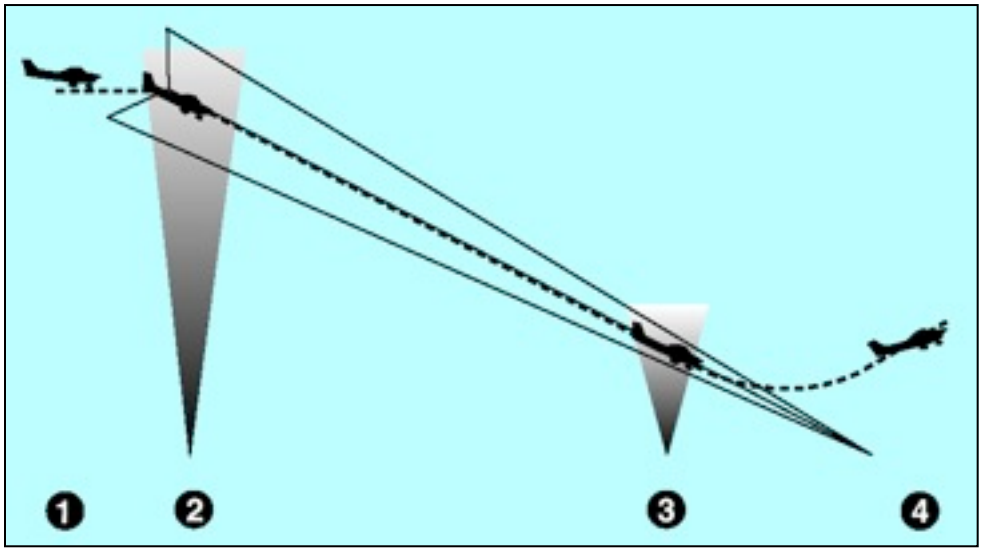
Scenario 4
Front Course
ILS Approach (2)



2. The autopilot is following the localizer. At the outer marker, the glideslope deviation needle is at midscale. Altitude hold is automatically disengaged when the glideslope is captured. The **ALT** annunciator extinguishes and **GS** is displayed. The autopilot will make pitch and bank changes as necessary to maintain localizer and glideslope.

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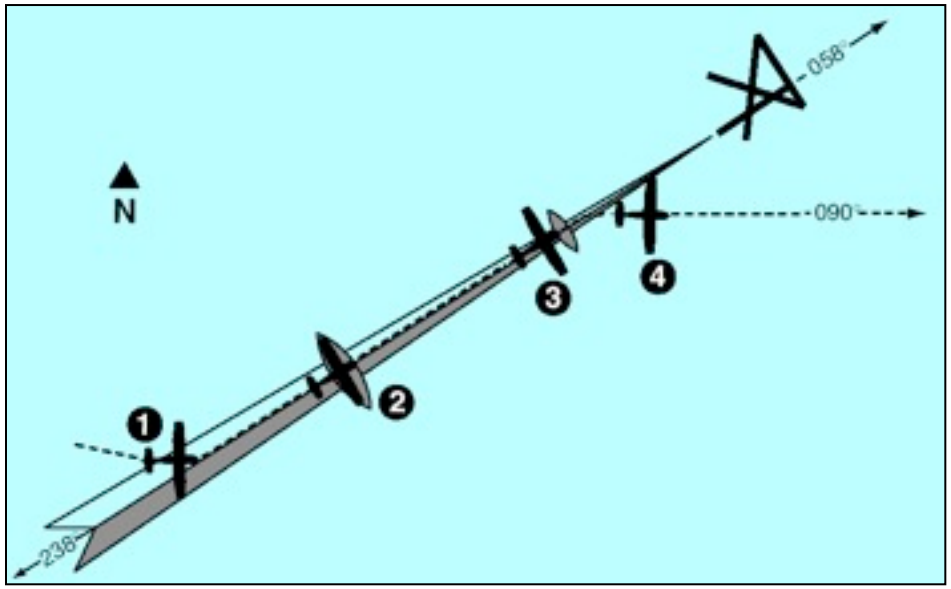
Scenario 4
Front Course
ILS Approach (3)



3. At the middle marker, the pilot disengages the autopilot with the button on the control wheel. This cancels all operating modes. The flashing **AP** annunciations are displayed and a disconnect tone will sound.

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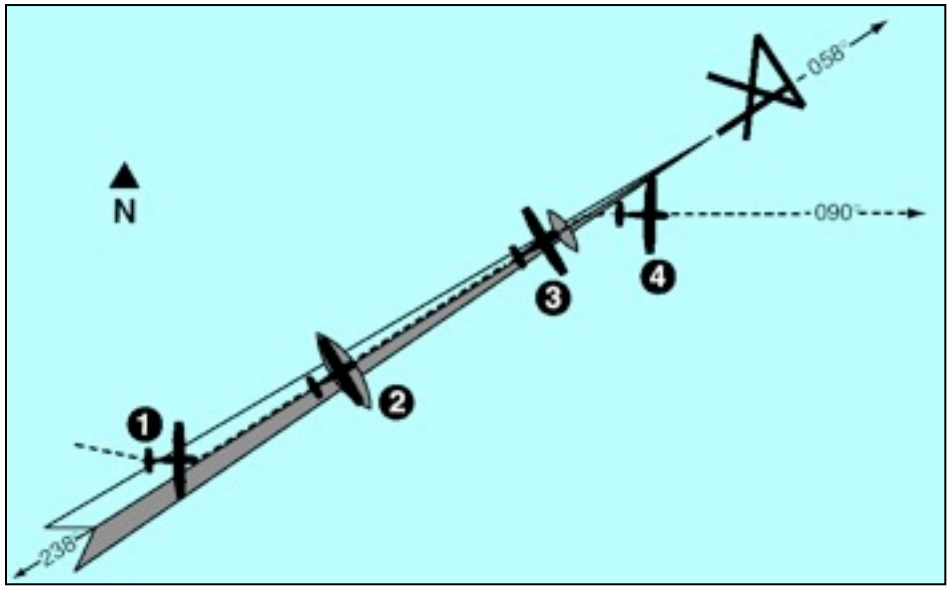
Scenario 4
Front Course
ILS Approach (4)



4. The pilot initiates the missed approach and stabilizes the aircraft in the climb. The heading bug is set to the missed approach heading of 090°. By depressing the **HDG** button on the KAP 140, the autopilot engages into the heading and vertical speed modes, commencing a right turn to a heading of 090° and maintaining the rate of climb existing at engagement.

*Note: On newer models, you must press and hold the **AP** button for 0.25 seconds to engage the autopilot.*

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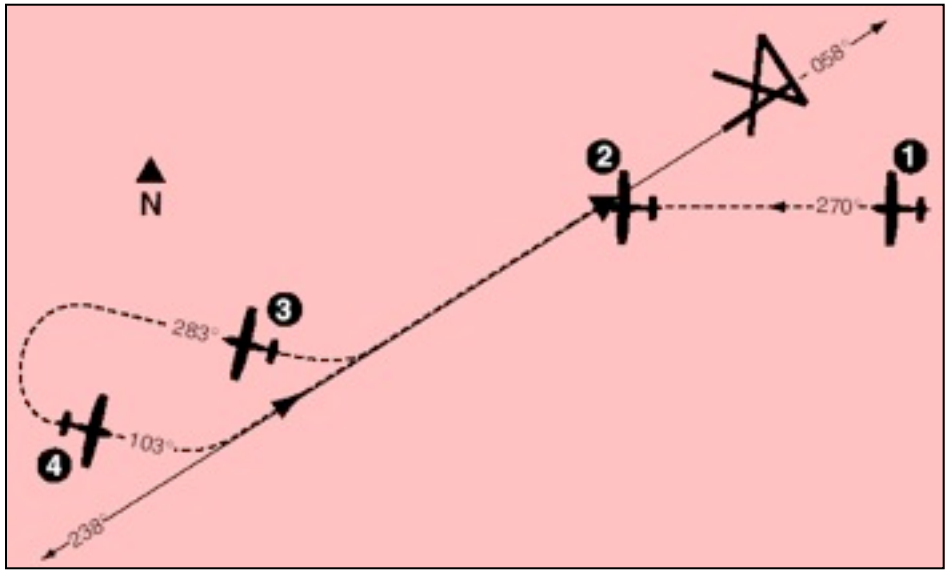
Scenario 5
Outbound on GPS Approach (1)



1. The aircraft is in APR mode approaching the IAF. Approach arm is indicated on the GPS annunciator.

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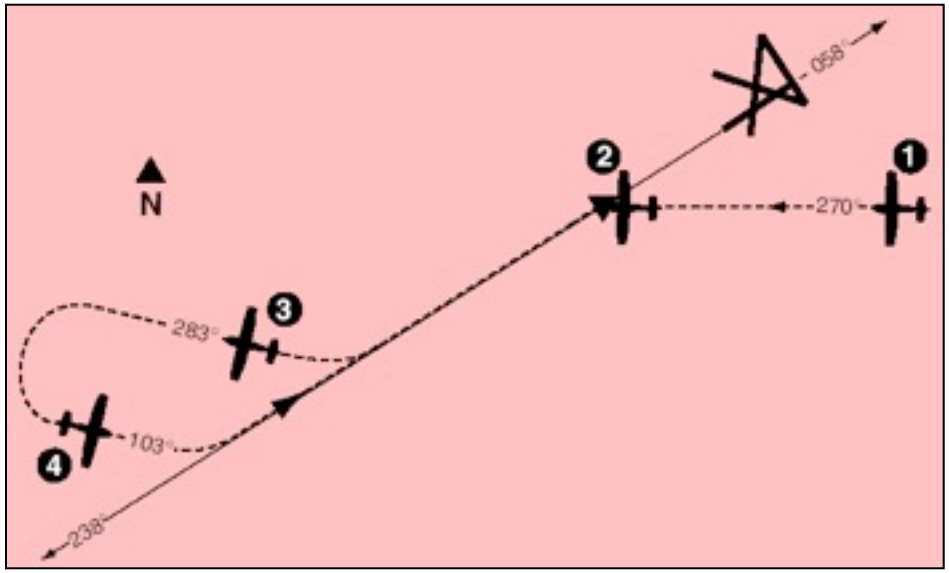
Scenario 5
Outbound on GPS
Approach (2)



2. Upon waypoint alerting at the IAF, the heading bug is set to 238°, the GPS's Leg/OBS mode switching is set to OBS mode and the OBS is set to 238°. The autopilot initiates a left turn to track the 238° GPS course.

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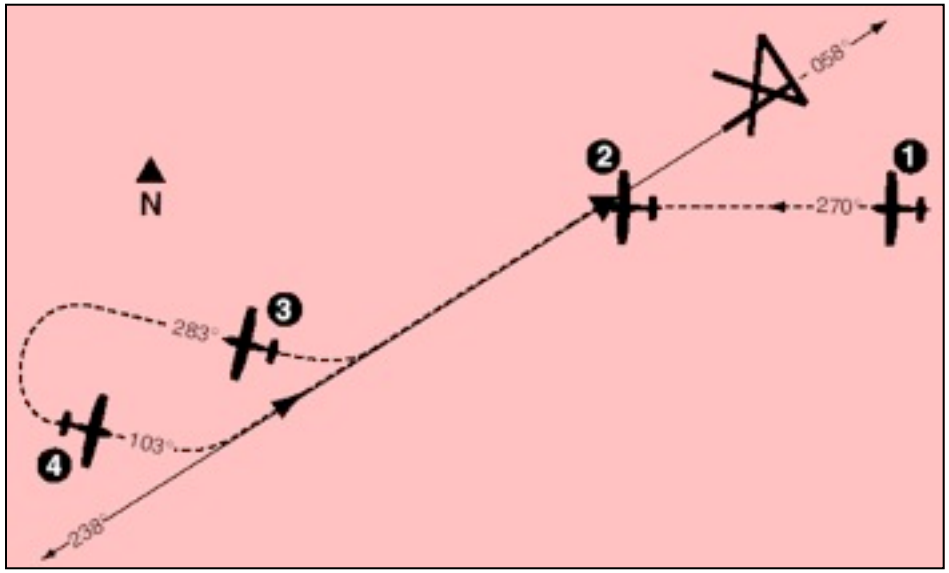
Scenario 5
Outbound on GPS
Approach (3)



3. At the desired point, heading mode is used to initiate the procedure turn. During the procedure turn outbound, the deviation bar shows that the aircraft is flying away from the GPS course at a 45° angle on a selected heading of 283°.

Check the heading displayed on the DG against the magnetic compass and reset if necessary.

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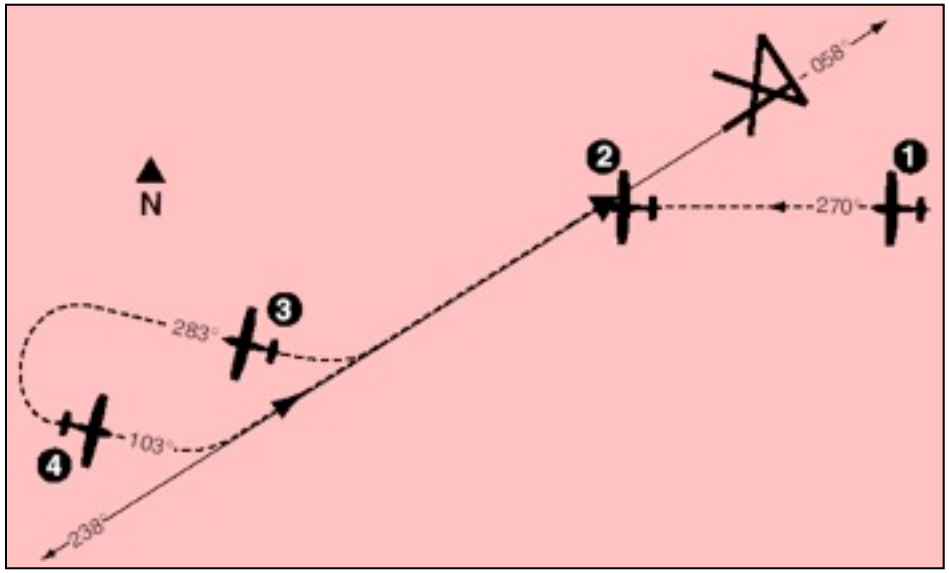
Scenario 5
Outbound on GPS
Approach (4)



4. The heading bug has been set to 103° and the aircraft has made a left turn to this heading. The GPS's Leg/OBS mode switching is set to Leg mode and the OBS is set to 058°. Select approach mode by depressing the **APR** button. The HDG annunciation will flash for five seconds then extinguish. While the HDG annunciation is flashing, move the heading bug to 058°. Since the 45° intercept is 103°, the aircraft will not turn until the course is captured.

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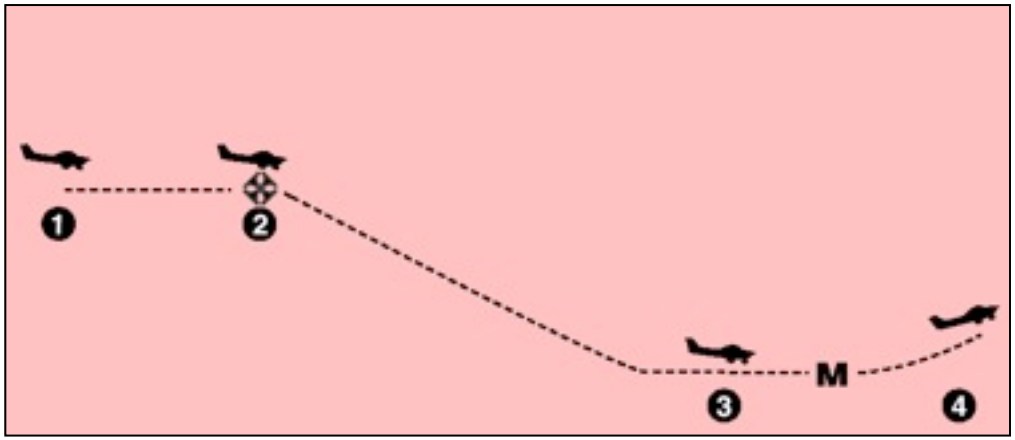
Scenario 6
Inbound on GPS
Approach (1)



1. Continuing the approach from scenario 5, APR mode capture occurs. The autopilot initiates a left turn to track the 058° GPS course. Approach active is indicated on the GPS annunciator.

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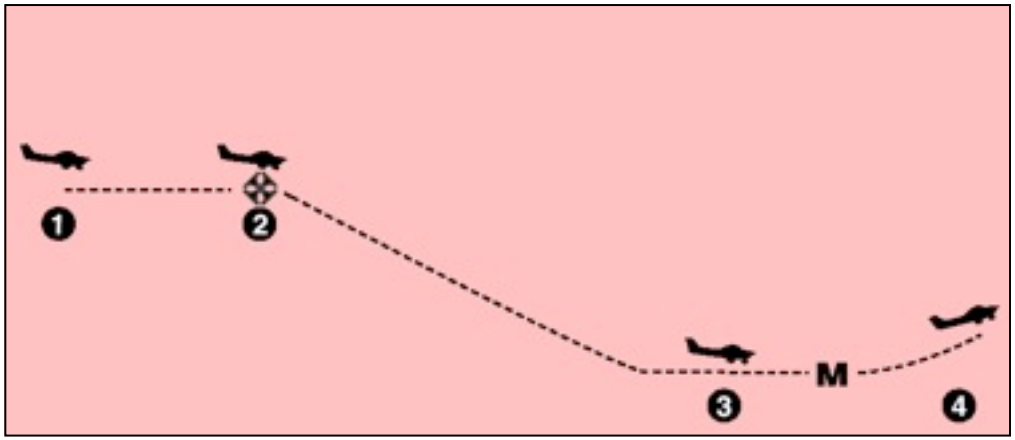
Scenario 6
Inbound on GPS Approach (2)



2. At the FAF, **ALT** is depressed to activate vertical speed mode. The desired descent rate is obtained using the **DN** button.

Remember, speed needs to be controlled with the throttle.

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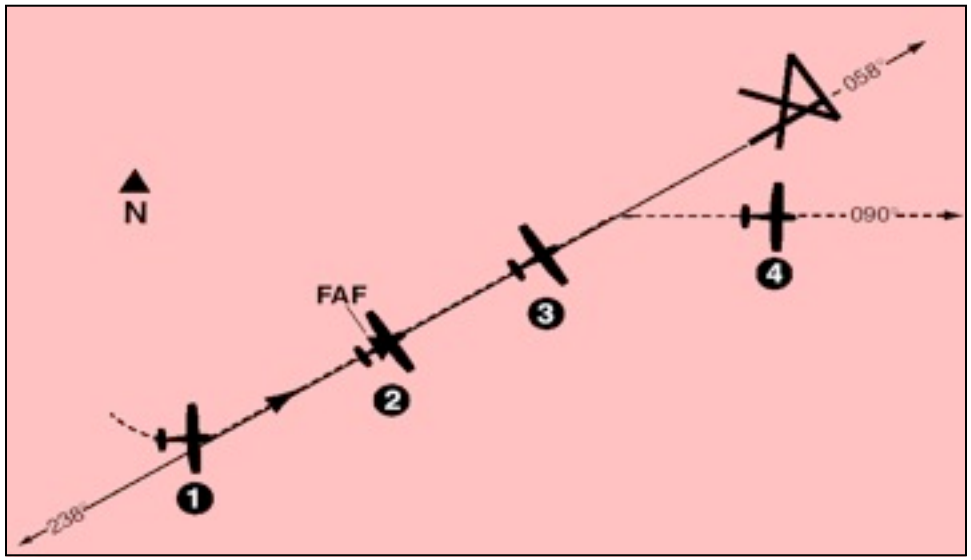
Scenario 6
Inbound on GPS
Approach (3)



3. At the MDA, the **ALT** button is depressed causing the autopilot to level off and maintain a constant altitude. At the MAP the pilot disengages the autopilot with the button on the control wheel. A flashing AP annunciation is displayed and a distinctive tone will sound.

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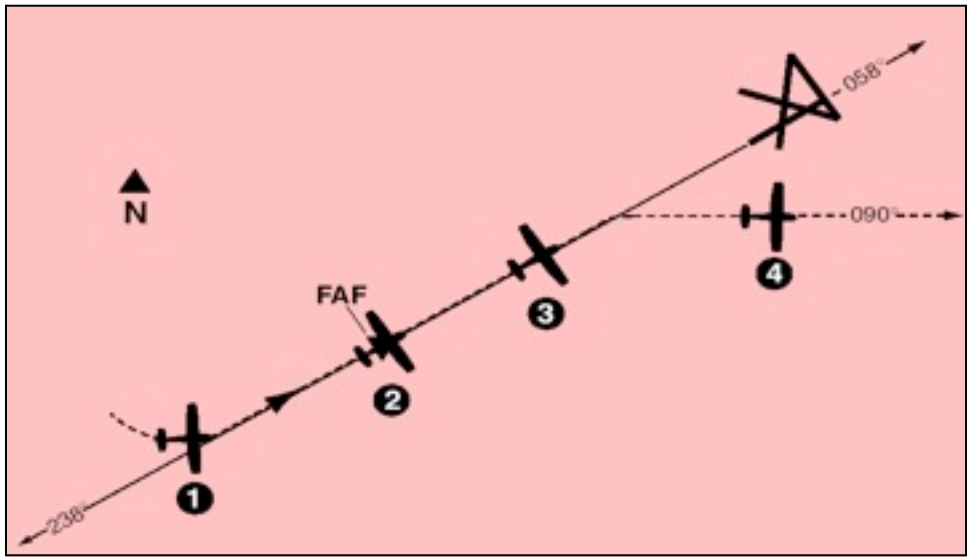
Scenario 6
Inbound on GPS Approach (4)



4. The pilot initiates the missed approach and stabilizes the aircraft in the climb. The heading bug is set to the missed approach heading of 090°. By depressing the **HDG** button on the KAP 140, the autopilot engages into the heading and vertical speed modes, commencing a right turn to a heading of 090° and maintaining the rate of climb existing at engagement.

*Note: On newer models, you must press and hold the **AP** button for 0.25 seconds to engage the autopilot.*

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The End

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