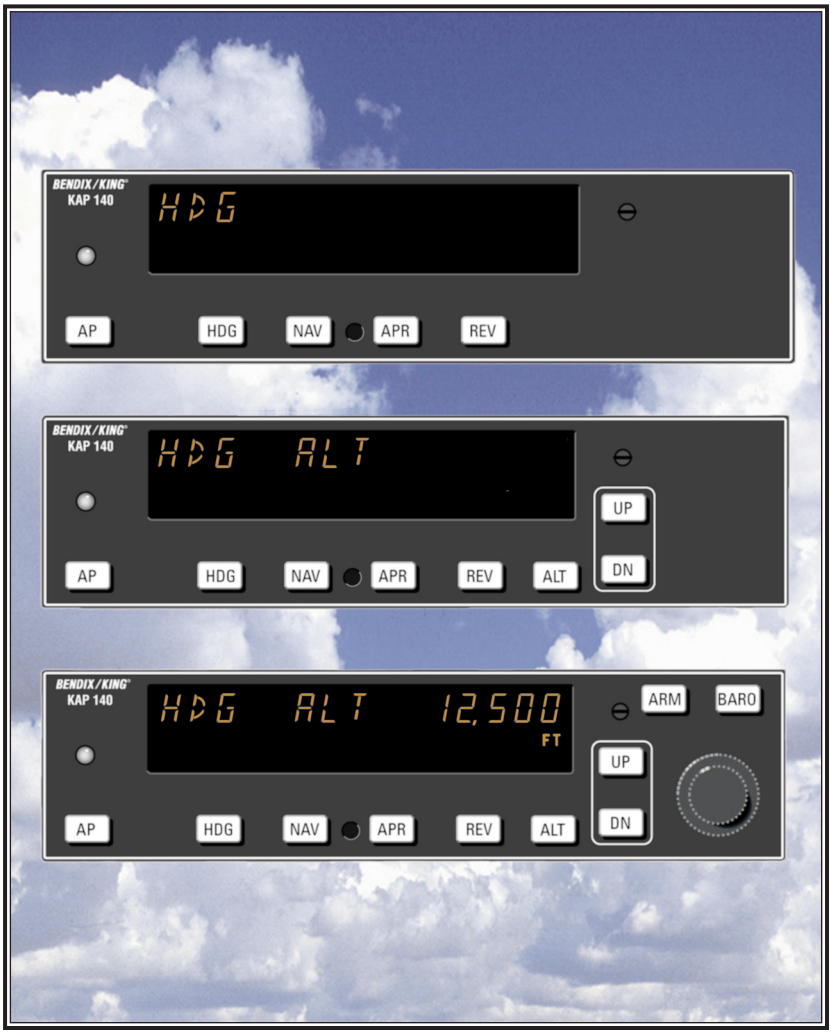
Pilot's Guide

KAP 140

Bendix/King®
Autopilot System



006-18034-0000
Jun 98

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Introduction

The KAP 140 Autopilot System is a rate based digital autopilot system offering smooth performance and enhanced features found only in more expensive autopilots. The first of its type developed by AlliedSignal, this system brings digital technology and reliability into the light aircraft cockpit.

It is also significant that the KAP 140 series autopilots have been designed from their inception to interface with the Silver Crown package of products. Consider the advantage of having your avionics working together as an integrated system rather than as a group of components built by several manufactures.

Your new KAP 140 roll axis features include wing leveler, heading select, and VOR/LOC intercept and tracking. The KAP 140 can also be coupled to GPS and RNAV receivers as well. Roll rate information is derived from the turn coordinator. Pitch axis features include vertical speed, glideslope and altitude hold along with the optional altitude preselect. Pitch information is derived from a pressure sensor and accelerometer. The KAP 140 Autopilot System operates independent of the aircraft's artificial horizon. Therefore, the autopilot retains roll stabilization and all vertical modes in the event of vacuum system failure.

Internal monitors keep constant track of the KAP 140's status and provide for automatic shutdown of the autopilot or trim system in the event of a malfunction. In addition to reliability, the KAP 140 is designed to be easily maintained in the field. Qualified AlliedSignal Service Centers are located around the world to provide assistance whenever necessary.

To fully realize the capability of your new panel mount digital autopilot system, you must understand the performance capabilities and basic operational requirements of the system. This pilot's guide provides information to aid in this and is divided up into six sections. The first section provides general familiarization of each autopilot system including the associated panel mounted displays. The second section describes the KAP 140 Single Axis Autopilot System. The third section describes the KAP 140 Two Axis Autopilot System. The fourth section describes the KAP 140 Two Axis/Altitude Preselect Autopilot System. The fifth section describes the optional KCS 55A slaved compass system. The Sixth section describes abnormal procedures.

General Description

KAP 140 Single Axis Autopilot System

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

KAP 140 Two Axis/Altitude Preselect Autopilot System

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

KAP 140 Two Axis Autopilot System

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

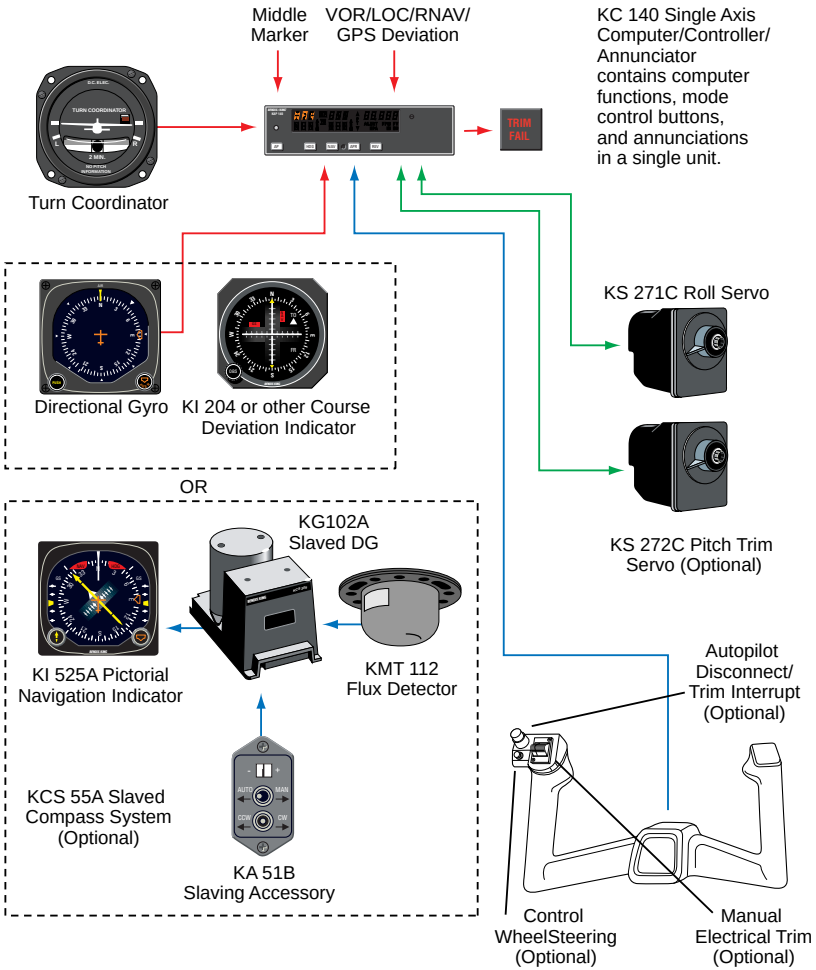
	KAP 140 Two Axis Alt. Preselect	KAP 140 Two Axis	KAP 140 Single Axis
HSI	Optional	Optional	Optional
DG	Standard	Standard	Standard
Turn Coordinator	Standard	Standard	Standard
Automatic Electric Elevator Trim	Optional	Optional	Optional
Manual Electric Trim	Optional	Optional	Optional
FUNCTIONS/MODES			
ALT Hold (ALT)	Yes	Yes	
ALT Preselect/ALERT	Yes		
Heading Select (HDG)	Yes	Yes	Yes
NAV (VOR/RNAV/GPS)	Yes	Yes	Yes
Approach (APR)	Yes	Yes	Yes
Glideslope (GS)	Yes	Yes	
Back Course (REV)	Yes	Yes	Yes
Control Wheel Steering (CWS)	Optional	Optional	Optional
Vertical Speed Hld	Yes	Yes	
Auto Capture	Yes	Yes	Yes
Auto Track	Yes	Yes	Yes
All Angle Intercept	Standard (with DG or optional HSI)	Standard (with DG or optional HSI)	Standard (with DG or optional HSI)
Auto 45-degree Intercept	Standard (with DG only)	Standard (with DG only)	Standard (with DG only)
TEST			
Manual and Auto Trim Monitor	Both	Both	Both
Acceleration Monitor	Yes	Yes	

KAP 140 System Capabilities

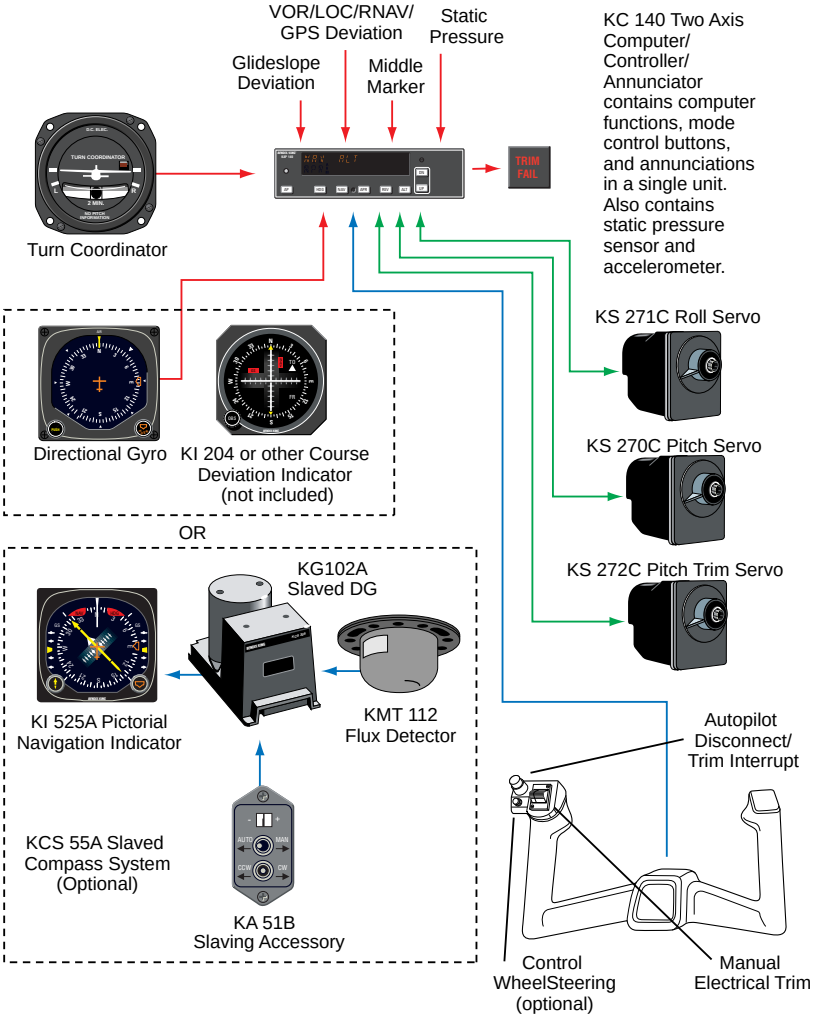
System Integration

The individual system diagrams on pages 5, 6, and 7 show the components and their relationship in typical KAP 140 Single Axis, KAP 140 Two Axis, and KAP 140 Two Axis/Altitude Preselect systems. The actual components on individual systems may vary slightly in order to optimize certification and installation requirements.

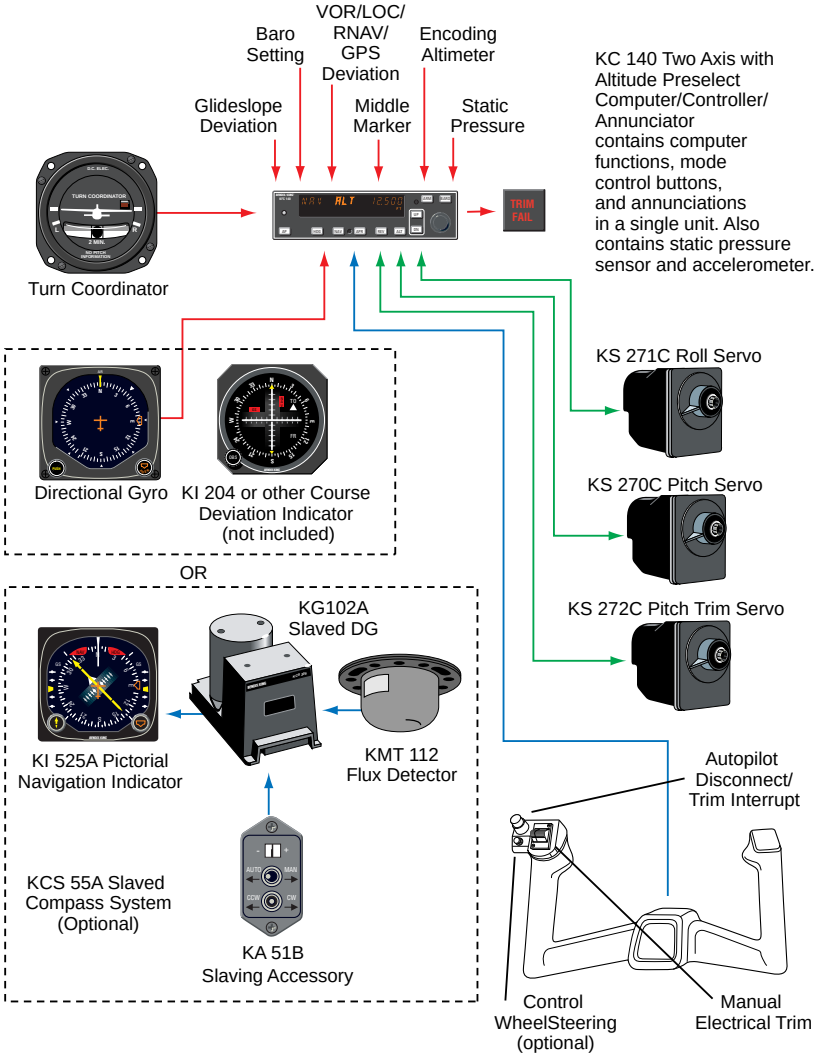
Each system has a number of inputs: sensor outputs are shown in red; combination inputs are shown in blue; display outputs are shown in orange; and aircraft control shown in green. The systems diagrams reflect that the KAP 140 systems control both pitch and roll axes of the aircraft.



KAP 140 Single Axis System Diagram



KAP 140 Two Axis System Diagram



KAP 140 Two Axis/Altitude Preselect System Diagram

Power Application and Preflight Tests

KAP 140 Preflight Test

KAP 140 Preflight Test Complete

A preflight test is performed upon power application to the computer. This test is a sequence of internal checks that validate proper system operation prior to allowing autopilot engagement. The preflight test (PFT) sequence is indicated by "PFT" with an increasing number for the sequence steps. Successful completion of self test is identified by all display segments being illuminated (Display Test) and the disconnect tone sounding.

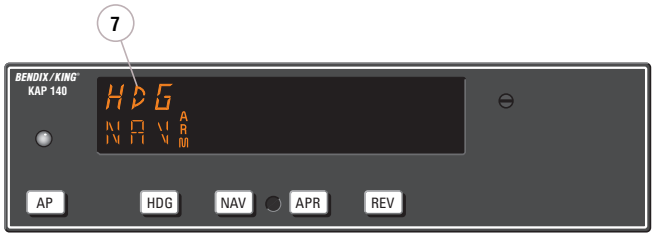
For two-axis units only:

NOTE: Following the preflight test, the red P warning on the face of the autopilot may illuminate indicating that the pitch axis cannot be engaged. This condition should be temporary, lasting no more than 30 seconds. The P will extinguish and normal operation will be available.

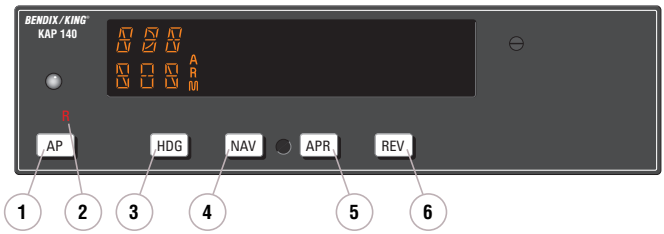
If power to the autopilot is cycled in flight (i.e. through the autopilot circuit breaker for instance) it is possible that a 5 minute delay may be necessary prior to autopilot engagement to allow the pitch axis accelerometer circuit to stabilize. Engagement prior to stabilization may result in mildly erratic pitch axis behavior.

KAP 140 Single Axis Operation

The KAP 140 is a high-performance digital, panel-mounted autopilot system for light aircraft.



Single-axis Flight Control Computer



Full Single-axis KAP 140 Display

1. AUTOPILOT ENGAGE/DISENGAGE (**AP**) BUTTON - When pushed, engages autopilot if all logic conditions are met. The autopilot will engage in the basic roll (ROL) mode which functions as a wing leveler. When pressed again, will disengage the autopilot.

2. ROLL AXIS (**R**) ANNUNCIATION - When illuminated, indicates failure of the roll axis and will disengage the autopilot and not allow engagement.

3. HEADING (**HDG**) MODE SELECTOR BUTTON - When pushed, will select the Heading mode, which commands the airplane to turn to and maintain the heading selected by the heading bug on either the DG or HSI. A new heading may be selected at any time and will result in the airplane turning to the new heading. Button can also be used to toggle between HDG and ROL modes. This button will engage the autopilot.

4. NAVIGATION (**NAV**) MODE SELECTOR BUTTON - When pushed, will arm the navigation mode. The mode provides automatic beam capture and tracking of VOR, LOC or GPS as selected for presentation on the HSI or CDI. NAV mode is recommended for enroute navigation tracking.

5. APPROACH (**APR**) MODE SELECTOR BUTTON - When pushed, will arm the Approach mode. This mode provides automatic beam capture and tracking of VOR, GPS and LOC, as selected for presentation on the HSI or CDI. APR mode is recommended for instrument approaches.

6. BACK COURSE APPROACH (**REV**) MODE SELECTOR BUTTON - When pushed, will arm the Back Course approach mode. This mode functions similarly to the approach mode except that the autopilot response to LOC signals is reversed.

7. ROLL MODE DISPLAY - Displays the active and armed roll modes (ROL, HDG, NAV ARM, NAV, APR ARM, APR, REV ARM, REV). Also displayed will be flashing AP annunciation (5 seconds) at each autopilot disconnect accompanied by an aural tone (for 2 seconds).

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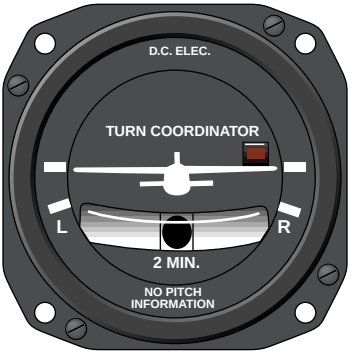
System Operating Modes



Wing Leveler (ROL) Mode

In the roll mode, the autopilot maintains wings level flight.

1. Engage autopilot - Press **AP**

*NOTE: The KAP 140 engages into **ROL** mode as a default.*

Heading Select (HDG) Mode

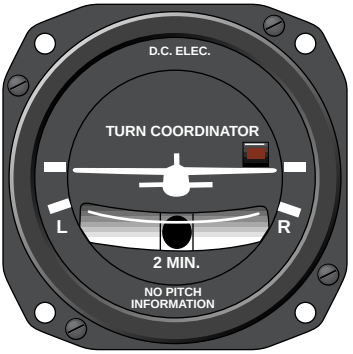
In the heading mode, the autopilot will fly a selected heading. The following steps should be taken to operate in the heading mode:

1. Move the heading “bug” to the desired heading on the DG or HSI using the Heading Select knob.

2. Depress the **HDG** button on the KAP 140 to engage the heading select mode. The autopilot will turn the aircraft in the shortest direction to intercept and fly the heading.

3. If you move the heading “bug” again while the heading select mode is engaged, the autopilot will immediately turn the aircraft in the direction of the newly selected heading.

4. Press **HDG** button again and the autopilot will return to the ROL mode.

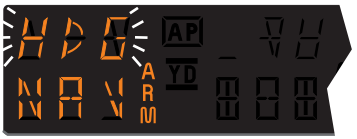


Navigation (NAV) Mode Using a DG from HDG Mode (45° Intercept)

In the navigation (**NAV**) mode, the autopilot intercepts and tracks VOR/RNAV and GPS courses.

To arm **NAV** mode (with the KAP 140 currently in the **HDG** mode):

1. Select the desired frequency for VOR or RNAV. For GPS, verify the desired waypoint or destination.
2. OBS Knob - SELECT desired course.
3. **NAV** Mode Selector Button - PRESS. Note **NAV ARM** annunciated.

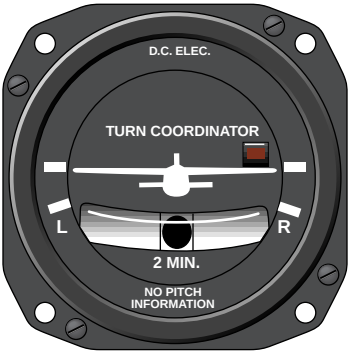


*NOTE: When **NAV** is selected, the autopilot will flash **HDG** for 5 seconds to remind the pilot to reset the HDG bug to the OBS course. Check the heading displayed on the DG against the magnetic compass and reset if necessary.*

4. Heading Selector Knob - ROTATE BUG to agree with OBS course.

Note Instruments: CDI needle to left. Intercept heading 45° to the left of selected (heading bug) course.

5. If the Course Deviation Bar is greater than 2 to 3 dots: the autopilot will annunciate **NAV ARM**; when the computed capture point is reached the **ARM** annunciator will go out and the selected course will be automatically captured and tracked. If the D-Bar is less than 2 to 3 dots: the **HDG** mode will disengage upon selecting NAV mode; the **NAV** annunciator will illuminate and the capture/track sequence will automatically begin.

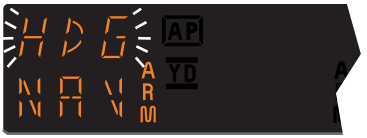


Navigation (NAV) Mode Using a DG from ROL Mode (All Angle Intercept)

In the navigation (**NAV**) mode, the autopilot intercepts and tracks VOR/RNAV and GPS courses.

To arm **NAV** mode (with the KAP 140 currently in the ROL mode):

1. Maneuver the aircraft to the desired intercept angle prior to selecting **ROL** mode.
2. Select the desired frequency for VOR or RNAV. For GPS, verify the desired waypoint or destination.
3. OBS Knob - SELECT desired course.
4. **NAV** Mode Selector Button - PRESS. Note **NAV ARM** annunciated.



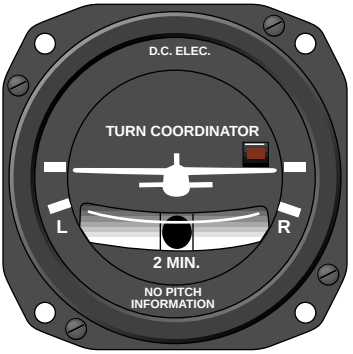
*NOTE: When **NAV** is selected, the autopilot will flash **HDG** for 5 seconds to remind the pilot to reset the HDG bug to the OBS course. Check the heading displayed on the DG against the magnetic compass and reset if necessary.*

5. Heading Selector Knob - ROTATE BUG to agree with OBS course.

Note Instruments: CDI needle to left. Intercept heading 30° to the left of selected (heading bug) course.

6. If the Course Deviation Bar is greater than 2 to 3 dots: the autopilot will annunciate **NAV ARM**; when the computed capture point is reached the **ARM** annunciator will go out and the selected course will be automatically captured and tracked. If the D-Bar is less than 2 to 3 dots: the **ROL** mode will disengage upon selecting **NAV** mode; the **NAV** annunciator will illuminate and the capture/track sequence will automatically begin.

Note: Intercept angles greater than 45° can result in course overshoot when close to the station. Therefore, intercept angles greater than 45° are not recommended.

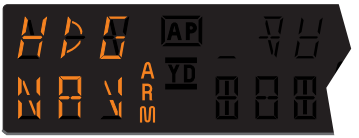


Navigation (NAV) Mode Using an HSI

In the navigation (**NAV**) mode, the autopilot intercepts and tracks VOR/RNAV and GPS courses.

To arm **NAV** mode (with the KAP 140 currently in the **HDG** mode):

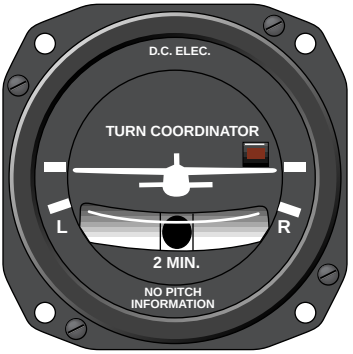
1. Select the desired frequency for VOR or RNAV. For GPS, verify the desired waypoint or destination.
2. Course Bearing Pointer - SET to desired course.
3. Heading Selector Knob - SET BUG to provide desired intercept angle and engage HDG mode. Note **NAV ARM** annunciated.



4. **NAV** Mode Selector Button - PRESS.

5. If the Course Deviation Bar is greater than 2 to 3 dots: the aircraft will continue in **HDG** mode (or **ROL** if **HDG** is not selected) with **NAV ARM** annunciated; when the computed capture point is reached **HDG** will disengage, the **ARM** annunciator will go out and the selected course will be automatically captured and tracked. If the D-Bar is less than 2 to 3 dots: the **HDG** mode (or **ROL** if **HDG** is not selected) will disengage upon selecting **NAV** mode; the **NAV** annunciator will illuminate and the capture/ track sequence will automatically begin.

Note: Intercept angles greater than 45° can result in course overshoot when close to the station. Therefore, intercept angles greater than 45° are not recommended.

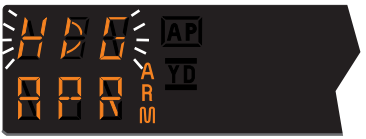


Approach (APR) Mode Using a DG from HDG Mode (45° Intercept)

The Approach (**APR**) mode allows the autopilot to intercept and track LOC, VOR/RNAV and GPS courses.

To arm **APR** mode (with the KAP 140 currently in the HDG mode):

1. Select the desired frequency for LOC, VOR or RNAV. For GPS, verify the desired approach.
2. OBS Knob - SELECT desired approach course. (For a localizer, set it to serve as a memory aid.)
3. **APR** Mode Selector Button - PRESS. Note **APR ARM** annunciated.

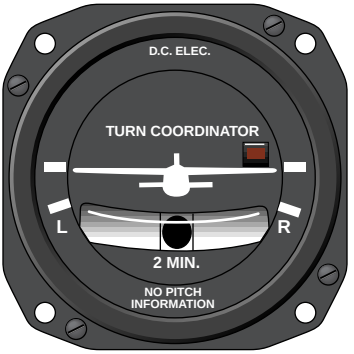


*NOTE: When **APR** is selected, the autopilot will flash **HDG** for 5 seconds to remind the pilot to reset the HDG bug to the desired approach course. Check the heading displayed on the DG against the magnetic compass and reset if necessary.*

4. Heading Selector Knob - ROTATE BUG to agree with desired approach course.

Note Instruments: CDI needle to left. Intercept heading 45° to the left of selected (heading bug) course.

5. If the Course Deviation Bar is greater than 2 to 3 dots: the autopilot will annunciate **APR ARM**; when the computed capture point is reached the **ARM** annunciator will go out and the selected course will be automatically captured and tracked. If the D-Bar is less than 2 to 3 dots: the **HDG** mode will disengage upon selecting **APR** mode; the **APR** annunciator will illuminate and the capture/track sequence will automatically begin.

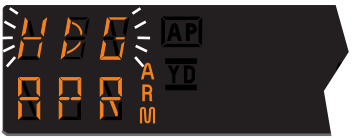


Approach (APR) Mode Using a DG from ROL Mode (All Angle Intercept)

The Approach (**APR**) mode allows the autopilot to intercept and track LOC, VOR/RNAV and GPS courses.

To arm **APR** mode (with the KAP 140 currently in the ROL mode):

1. Maneuver the aircraft to the desired intercept angle prior to selecting **ROL** mode.
2. Select the desired frequency for LOC, VOR or RNAV. For GPS, verify the desired approach.
3. OBS Knob - SELECT desired approach course. (For a localizer, set it to serve as a memory aid.)
4. **APR** Mode Selector Button - PRESS. Note **APR ARM** annunciated.



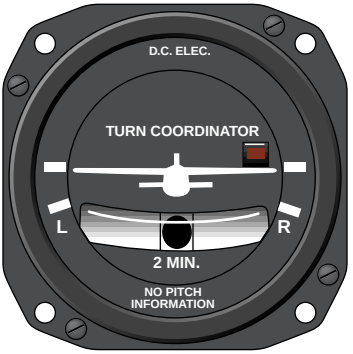
*NOTE: When **APR** is selected, the autopilot will flash **HDG** for 5 seconds to remind the pilot to reset the HDG bug to the desired approach course. Check the heading displayed on the DG against the magnetic compass and reset if necessary.*

5. Heading Selector Knob - ROTATE BUG to agree with desired approach course.

Note Instruments: CDI needle to left. Intercept heading 30° to the left of selected (heading bug) course.

6. If the Course Deviation Bar is greater than 2 to 3 dots: the autopilot will annunciate **APR ARM**; when the computed capture point is reached the **ARM** annunciator will go out and the selected course will be automatically captured and tracked. If the D-Bar is less than 2 to 3 dots: the **ROL** mode will disengage upon selecting **APR** mode; the **APR** annunciator will illuminate and the capture/track sequence will automatically begin.

Note: Intercept angles greater than 45° can result in course overshoot when close to the station. Therefore, intercept angles greater than 45° are not recommended.

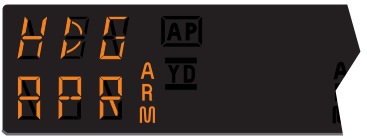


Approach (APR) Mode Using an HSI

The Approach (**APR**) mode allows the autopilot to intercept and track LOC, VOR/RNAV and GPS courses.

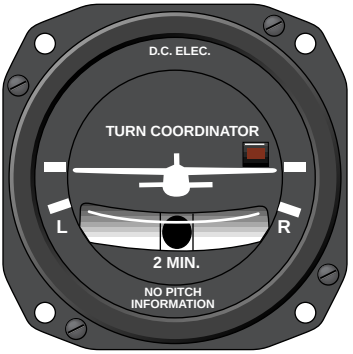
To arm **APR** mode (with the KAP 140 currently in the HDG mode):

1. Select the desired frequency for LOC, VOR or RNAV. For GPS, verify the desired approach.
2. Course Bearing Pointer - SET to desired course.
3. Heading Selector Knob - SET BUG to provide desired intercept angle.
4. APR Mode Selector Button - PRESS. Note **APR ARM** annunciated.



5. If the Course Deviation Bar is greater than 2 to 3 dots: the aircraft will continue in **HDG** mode (or **ROL** if **HDG** is not selected) with the **APR ARM** annunciated; when the computed capture point is reached **HDG** mode will disengage, the **ARM** annunciator will go out and the selected course will be automatically captured and tracked. If the D-Bar is less than 2 to 3 dots: the **HDG** mode (or **ROL** if **HDG** is not selected) will disengage upon selecting **APR** mode; the **APR** annunciator will illuminate and the capture/track sequence will automatically begin.

Note: Intercept angles greater than 45° can result in course overshoot when close to the station. Therefore, intercept angles greater than 45° are not recommended.



Back Course (REV) Mode Using a DG from HDG Mode (45° Intercept)

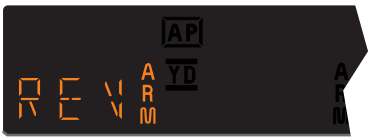
The Back Course (**REV**) mode allows the autopilot to intercept and track a localizer back course.

To arm **REV** mode (with the KAP 140 currently in the HDG mode):

1. Select the desired frequency for LOC.
2. OBS Knob - SELECT front course inbound heading.
3. **REV** Mode Selector Button - PRESS. Note **REV ARM** annunciated.

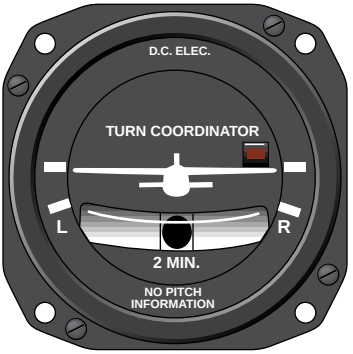
*NOTE: When **REV** is selected, the autopilot will flash **HDG** for 5 seconds to remind the pilot to reset the HDG bug to the front course inbound heading. Check the heading displayed on the DG against the magnetic compass and reset if necessary.*

4. Heading Selector Knob - ROTATE BUG to agree with the FRONT COURSE inbound heading.



Note Instruments: CDI needle to the right. Intercept heading 45° to the left of the back course.

5. If the Course Deviation Bar is greater than 2 to 3 dots: the autopilot will annunciate **REV ARM**; when the computed capture point is reached the **ARM** annunciator will go out and the selected course will be automatically captured and tracked. If the D-Bar is less than 2 to 3 dots: the **HDG** mode will disengage upon selecting **REV** mode; the **REV** annunciator will illuminate and the capture/track sequence will automatically begin.

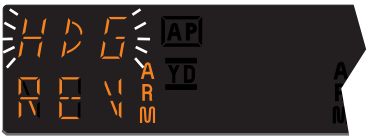


Back Course (REV) Mode Using a DG from ROL Mode (All Angle Intercept)

The Back Course (**REV**) mode allows the autopilot to intercept and track a localizer back course.

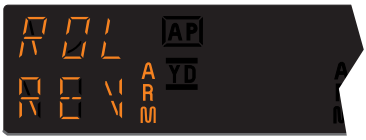
To arm **REV** mode (with the KAP 140 currently in the ROL mode):

1. Maneuver the aircraft to the desired intercept angle prior to selecting **ROL** mode.
2. Select the desired frequency for LOC.
3. OBS Knob - SELECT front course inbound heading.
4. **REV** Mode Selector Button - PRESS. Note **REV ARM** annunciated.



*NOTE: When **REV** is selected, the autopilot will flash **HDG** for 5 seconds to remind the pilot to reset the HDG bug to the front course inbound heading. Check the heading displayed on the DG against the magnetic compass and reset if necessary.*

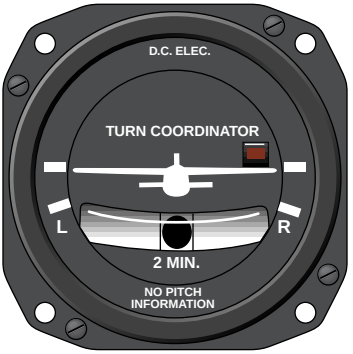
5. Heading Selector Knob - ROTATE BUG to agree with the FRONT COURSE inbound heading.



Note Instruments: CDI needle to the right. Intercept heading 30° to the left of the back course.

6. If the Course Deviation Bar is greater than 2 to 3 dots: the autopilot will annunciate **REV ARM**; when the computed capture point is reached the **ARM** annunciator will go out and the selected course will be automatically captured and tracked. If the D-Bar is less than 2 to 3 dots: the **HDG** mode will disengage upon selecting **REV** mode; the **REV** annunciator will illuminate and the capture/track sequence will automatically begin.

Note: Intercept angles greater than 45° can result in course overshoot when close to the station. Therefore, intercept angles greater than 45° are not recommended.



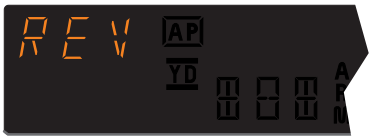
Back Course (REV) Mode Using an HSI

The Back Course (**REV**) mode allows the autopilot to intercept and track a localizer back course.

To arm **REV** mode (with the KAP 140 currently in the HDG mode):

1. Select the desired frequency for LOC.
2. Course Bearing Pointer - SET to the FRONT COURSE inbound heading.
3. Heading Selector Knob - SET BUG to provide desired intercept angle.
4. **REV** Mode Selector Button - PRESS. Note **REV ARM** annunciated.

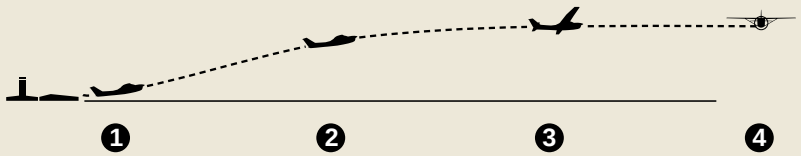
5. If the Course Deviation Bar is greater than 2 to 3 dots: the aircraft will continue in **HDG** mode (or **ROL** if **HDG** is not selected) with the **REV ARM** annunciated; when the computed capture point is reached **HDG** mode will disengage, the **ARM** annunciator will go out and the selected course will be automatically captured and tracked. If the D-Bar is less than 2 to 3 dots: the **HDG** mode (or **ROL** if **HDG** is not selected) will disengage upon selecting **REV** mode; the **REV** annunciator will illuminate and the capture/track sequence will automatically begin.

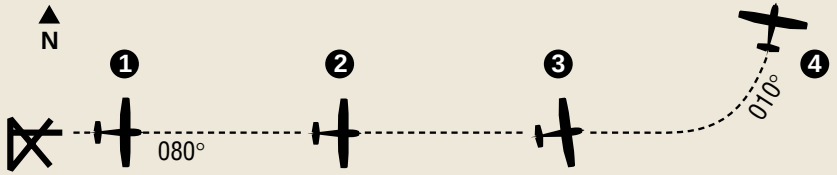


Note: Intercept angles greater than 45° can result in course overshoot when close to the station. Therefore, intercept angles greater than 45° are not recommended.

OPERATIONS WITH THE KAP 140

Takeoff And Climb To Assigned Altitude





1. The aircraft is well off the ground and established at a desired 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 mode and maintains the selected heading of 080°.

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.

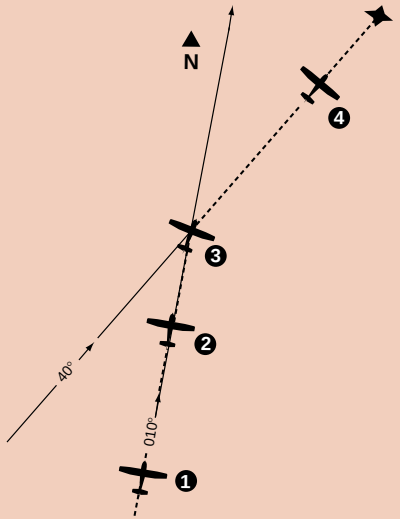
3. The autopilot is responding to the heading select mode with a left bank.

4. The autopilot has completed the turn and is now established on a 010° heading.

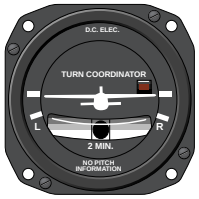
Note: The autopilot controls only the roll axis. The PILOT must maintain control of the pitch and yaw axis.

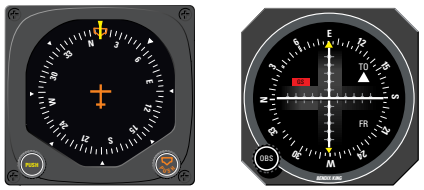
Single Axis Operation

GPS Capture Using DG

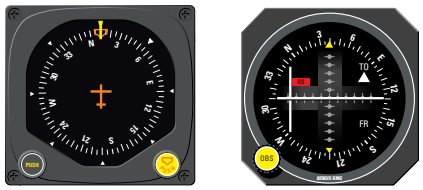


** Description of GPS operation based on Bendix/King GPS receiver. Others may require different operation.*

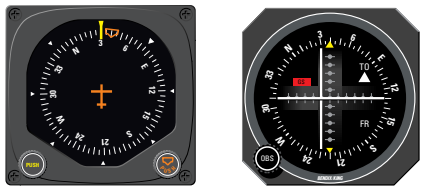




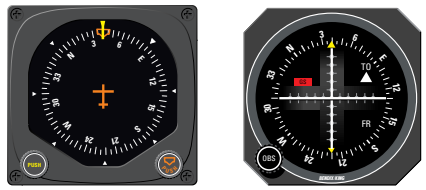
1. Continuing on heading 010°, a GPS waypoint is established. A 30° intercept is desired.



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.



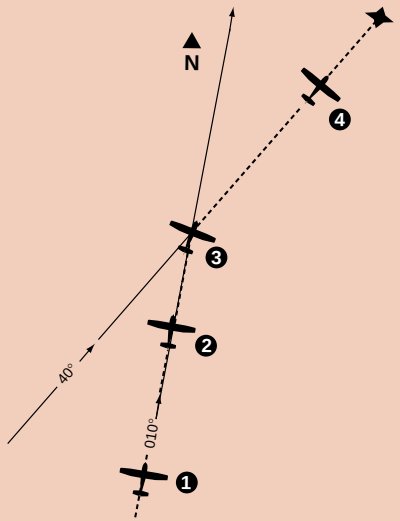
3. When the computed capture point is reached, the **ROL** annunciation changes to **NAV** and a right turn is initiated by the autopilot.



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

Single Axis Operation

GPS Capture Using HSI



** Description of GPS operation based on Bendix/King GPS receiver. Others may require different operation.*

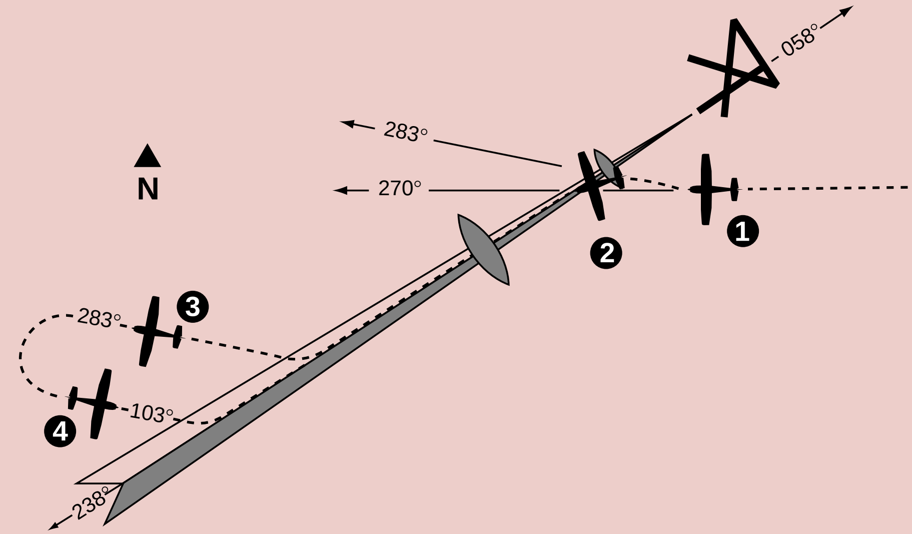
1. Continuing on heading 010°, a GPS waypoint is established. A 30° intercept is desired.

2. GPS data is selected for the HSI. The course pointer is set to 040°. The **NAV** button is depressed and **NAV ARM** is annunciated.

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

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

Outbound On Front Course For Procedure Turn To LOC Approach Using DG



1. The aircraft is heading 270° with heading engaged. To intercept and fly the LOC front course outbound, set the front course on the OBS and depress the back course (**REV**) button. 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. In this case, the aircraft will turn to 283°.

2. When the computed capture point is reached, auto-intercept mode is cancelled, the 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.

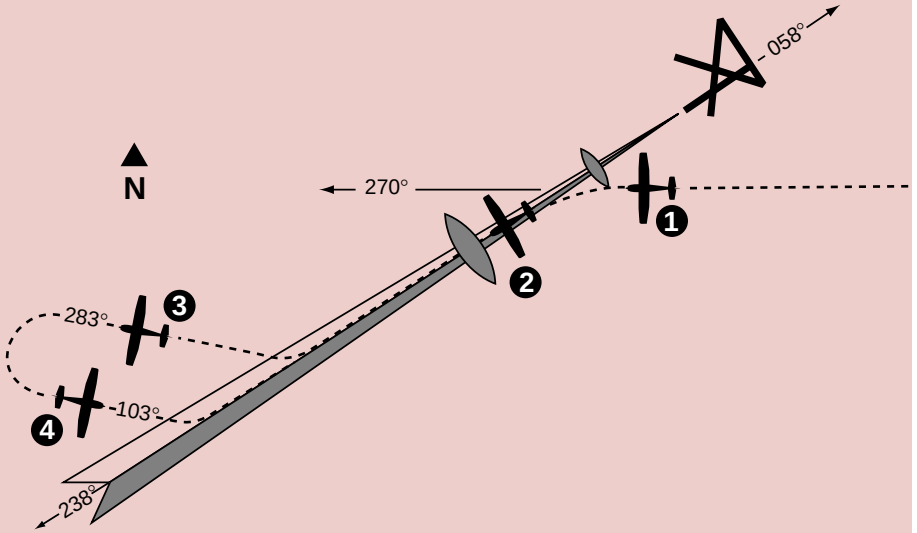
3. At the desired point, **HDG** mode is used to initiate the procedure turn. Select **HDG** and set the heading bug to 283°. During the procedure turn outbound, the CDI course index goes off scale to the right. The aircraft is flying away from the localizer centerline at a 45° angle on a selected heading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

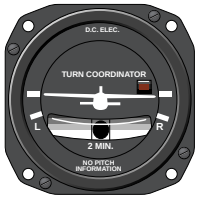
* Check the heading displayed on the DG against the magnetic compass and reset if necessary.

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°. You must now select the approach mode by depressing the **APR** button on the KAP 140. While the **HDG** annunciation 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.

Single Axis Operation

Outbound On Front Course For Procedure Turn To LOC Approach Using HSI





1. The aircraft is heading 270° with heading engaged. To intercept and fly the LOC front course outbound, set the front course on the HSI and depress the back course (**REV**) button. The back course (**REV**) mode is selected to go outbound on the front course. The capture point is now being computed based on closure rate.

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

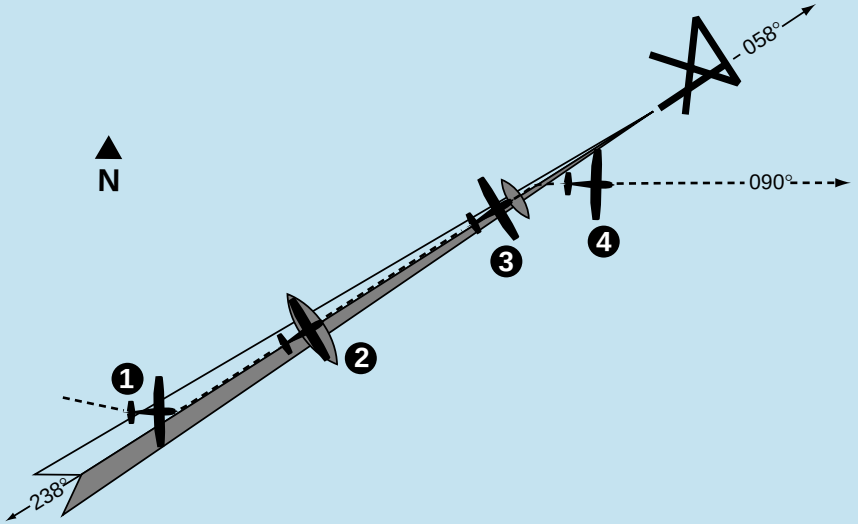
Note: The left-right deviations of the HSI course needle operate just as though you were flying a front course approach.

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 deviation bar shows that the aircraft is flying away from the localizer centerline at a 45° angle on a selected heading of 283°.

4. Now you have reset the heading bug to 103° and made a 180° turn to this heading. The 103° heading will intercept the front course of 058°. You must now select the approach mode by depressing the **APR** button on the KAP 140. Automatic capture of the localizer will occur.

Single Axis Operation

Front Course LOC Approach Using DG



1. Continuing the maneuver on page 38, APR coupling occurs (**HDG** annunciation changes to **APR**). The autopilot will capture the localizer and the CDI course index will center.

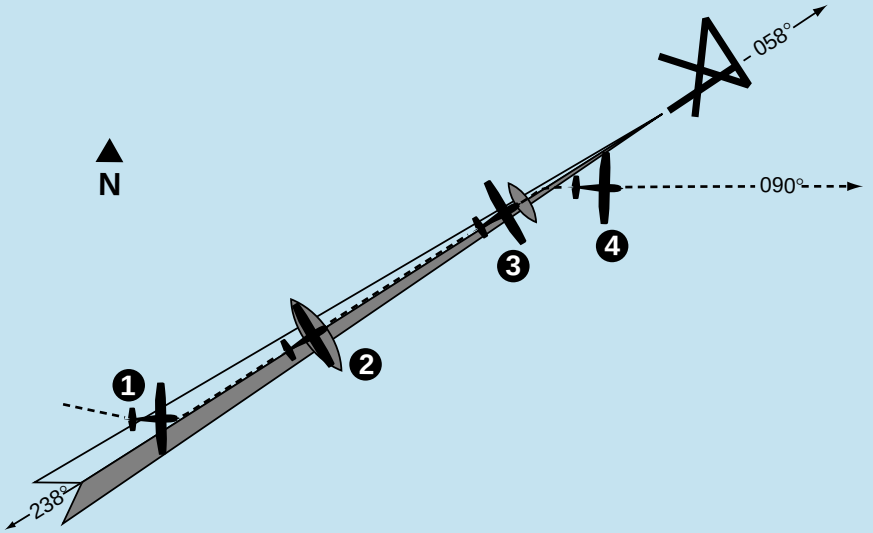
2. The autopilot is following the localizer. The autopilot will make the bank changes as necessary to maintain localizer .

3. At the missed approach point, the pilot disengages the autopilot with the button on the control wheel. This cancels all operating modes. A flashing **AP** annunciation is displayed and a disconnect tone will sound.

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 mode, commencing a right turn to a heading of 090°.

Single Axis Operation

Front Course LOC Approach Using HSI



1. Continuing the maneuver on page 40, APR coupling occurs (**HDG** annunciation changes to **APR**). The autopilot will capture the localizer and the CDI course index will center.

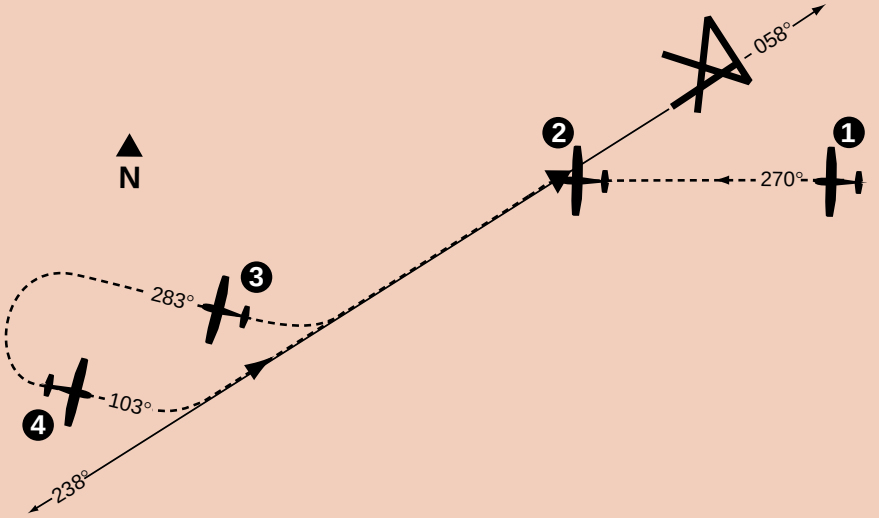
2. The autopilot is following the localizer. The autopilot will make bank changes as necessary to maintain localizer.

3. At the missed approach point, the pilot disengages the autopilot with the button on the control wheel. This cancels all operating modes.

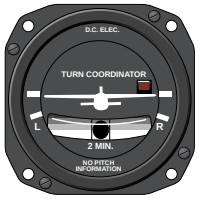
4. The pilot initiates the missed approach and stabilizes the aircraft in the climb. The heading bug is set to the missed approach heading of 090°. By depressing the **HDG** button on the KAP 140, the autopilot engages into the heading mode, commencing a right turn to a heading of 090°.

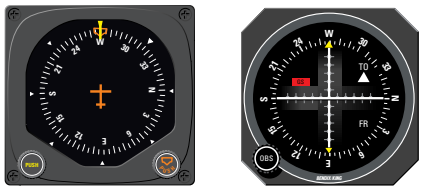
Single Axis Operation

Outbound on GPS Approach Using DG

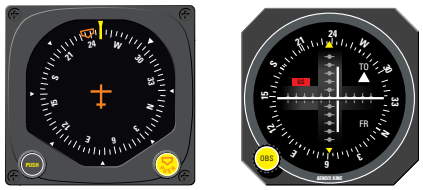


** Description of GPS operation based on Bendix/King GPS receiver. Others may require different operation.*

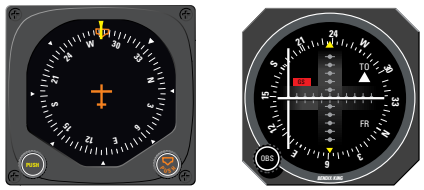




1. The aircraft is in **APR** mode approaching the IAF. Approach arm is indicated on the GPS annunciator.*

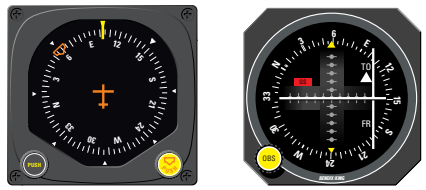


2. Upon waypoint alerting at the IAF, the heading bug is set to 238°, the GPS's Leg/OBS mode switching is set to OBS mode and the OBS is set to 238°. The autopilot initiates a left turn to track the 238° GPS course.



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°.

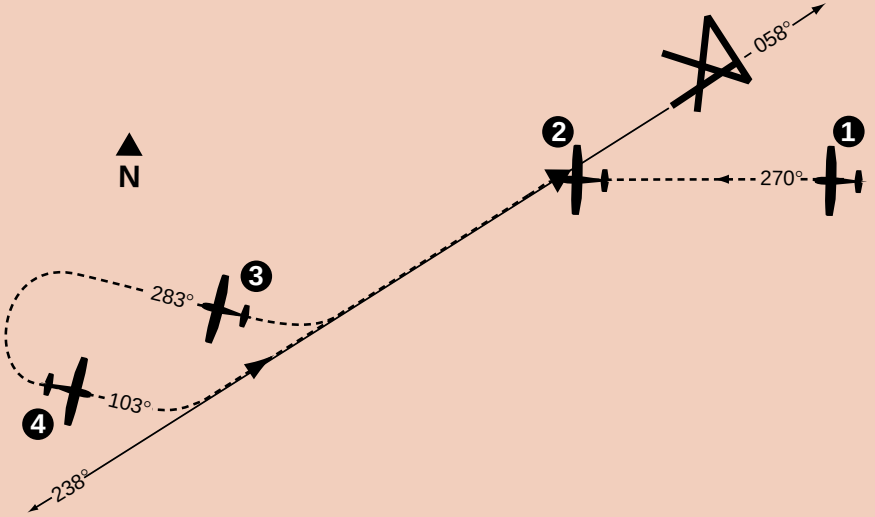
* Check the heading displayed on the DG against the magnetic compass and reset if necessary.



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.

Single Axis Operation

Outbound on GPS Approach Using HSI



** Description of GPS operation based on Bendix/King GPS receiver. Others may require different operation.*

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

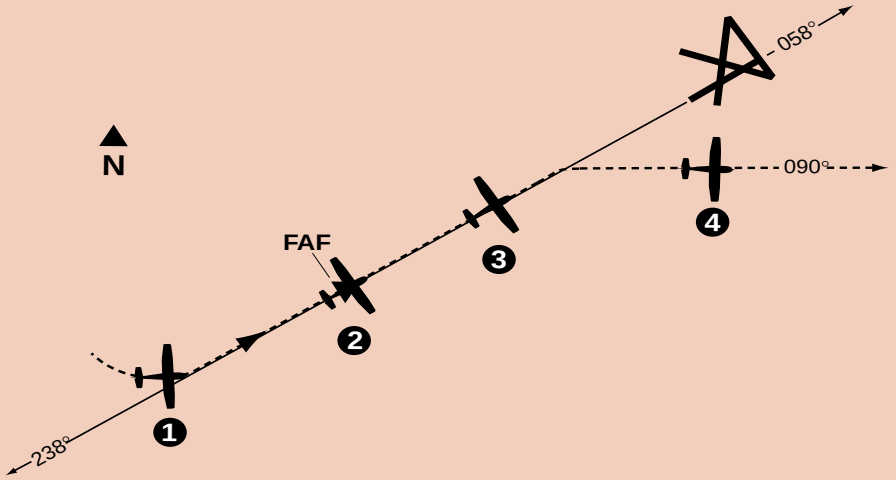
2. Upon waypoint alerting at the IAF, the course pointer is set to 238°, the GPS's Leg/OBS mode switching is set to OBS mode. The autopilot initiates a left turn to track the 238° GPS course.

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°.

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 course pointer is set to 058°. Select approach mode by depressing the **APR** button.

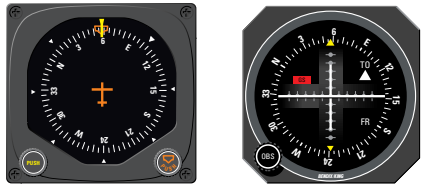
Single Axis Operation

Inbound on GPS Approach Using DG

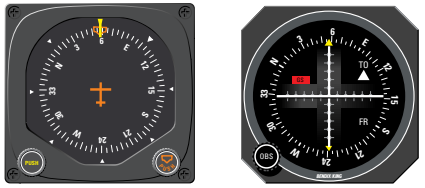


** Description of GPS operation based on Bendix/King GPS receiver. Others may require different operation.*

1. Continuing the maneuver on page 46, **APR** mode capture occurs. The autopilot initiates a left turn to track the 058° GPS course. Approach active is indicated on the GPS annunciator.*



2. The autopilot is following the GPS course. The autopilot will make the bank changes as necessary to maintain the GPS course.

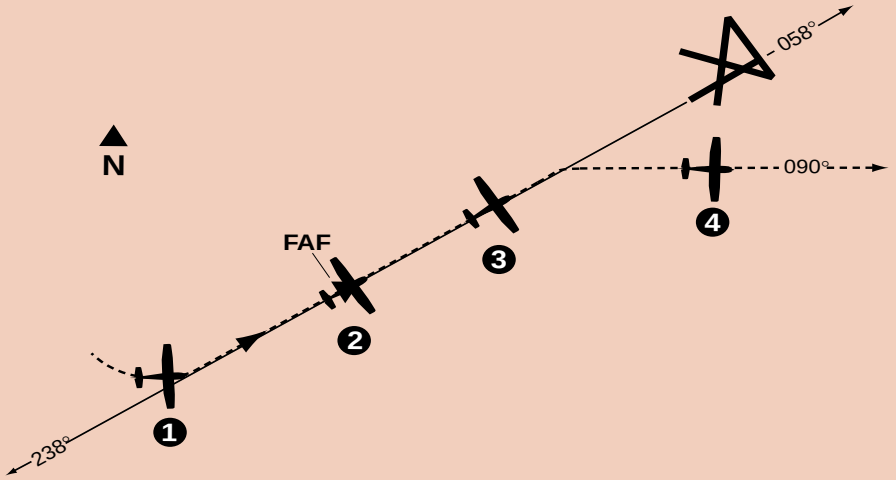


3. At the missed approach point, the pilot disengages the autopilot with the button on the control wheel. This cancels all operating modes. A flashing **AP** annunciation is displayed and a disconnect tone will sound.

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 mode, commencing a right turn to a heading of 090°.

Single Axis Operation

Inbound on GPS Approach Using HSI



** Description of GPS operation based on Bendix/King GPS receiver. Others may require different operation.*

1. Continuing the maneuver on page 48, **APR** mode capture occurs. The autopilot initiates a left turn to track the 058° GPS course.* Approach active is indicated on the GPS annunciator.*

2. The autopilot is following the GPS course. The autopilot will make the bank changes as necessary to maintain the GPS course.

3. At the missed approach point, the pilot disengages the autopilot with the button on the control wheel. This cancels all operating modes. A flashing **AP** annunciation is displayed and a disconnect tone will sound.

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 mode, commencing a right turn to a heading of 090°.

Abnormal Procedures

Autopilot Malfunction

An autopilot, autopilot trim or manual electric trim malfunction may be recognized as an uncommanded deviation in the airplane flight path or when there is abnormal control wheel or trim wheel motion. The primary concern in reacting to an autopilot or trim malfunction, or to an automatic disconnect of the autopilot, is in maintaining control of the airplane. Immediately grasp the control wheel and press and hold down the A/P DISC/TRIM INTER switch throughout the recovery. Manipulate the controls as required to safely maintain operation of the airplane within all of its operating limitations.

CAUTION: *Refer to the Airplane Flight Manual or the Airplane Flight Manual Supplement for your particular aircraft for pertinent emergency procedures.*

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Printed 2.5K 6/98 CW

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006-18034-0000

Rev. 0 6/98