

PILOT'S GUIDE FOR THE KFC 150/KAP 150 & KAP 100 FLIGHT CONTROL SYSTEMS



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INTRODUCTION



The pressures of single-pilot instrument flying place critical demands on the skill and concentration of any pilot.

To help you meet the challenge, King Radio has developed three digital, panel-mounted Silver Crown flight control systems for single and twin engine aircraft.

These systems bring digital flight control technology from the flight deck of the new generation airliners to the cockpits of piston powered aircraft for the first time. The result is lightweight, compact flight control systems which incorporate the functions of computer, mode selector, and annunciator in a single, panel-mounted unit. These digital panel-mounted systems use fewer parts than previous generation flight control systems for singles and twins. And fewer parts mean potentially greater reliability.

It's also significant that these Silver Crown flight control systems have been designed from the beginning to interface with your Silver Crown package of

COMM/NAV Pulse products. Consider the advantage of having your avionics working together as an integrated system rather than as a group of unrelated components built by several manufacturers.

To fully utilize the impressive capabilities of your new digital, panel-mounted flight control system, you must understand the performance capabilities and basic operational requirements of these advanced-design Silver Crown systems. This pilot's guide is divided into three sections. The first provides a general familiarization with each flight control system including the associated panel-mounted displays. The second section describes each system, including the KCS 55A slaved compass system and its operation, as well as optional altitude preselect/alerting and vertical speed hold. The final section covers emergency procedures and optional NAV 1/NAV 2 switching.

GENERAL DESCRIPTION: KFC 150, KAP 150 AND KAP 100



KFC 150 Flight Control System

The KFC 150 is the ultimate panel-mounted digital flight control system for singles and twins. It has the autopilot capability you need, plus a complete flight director system. The flight director provides attitude commands for the pilot to hand-fly, or displays to the pilot the commands being followed by the autopilot. The KFC 150 has capabilities similar to King's popular KFC 200 Flight Control System.

KAP 150 Autopilot System

The KAP 150 Autopilot System is a two-axis, panel-mounted digital system which delivers highly sophisticated IFR capability. It has modes and functions similar to the KFC 150 but has no flight director.

KAP 100 Autopilot System

The KAP 100 Autopilot System is a single-axis panel-mounted digital system which extends Silver Crown quality and reliability to an entirely new entry-level capability. The KAP 100 Autopilot is the most affordable option in the Silver Crown line of flight control systems and offers many substantial workload relief benefits.

The following chart highlights the major attributes of each of the three systems

SILVER CROWN PANEL-MOUNTED FLIGHT CONTROL SYSTEM CAPABILITIES

	KFC 150	KAP 150	KAP 100
Two Axis	Yes	Yes	—
Single Axis	—	—	Yes
Flight Director	Yes	—	—
KI 525A PNI	Standard	Optional	Optional
KG 107 DG	—	Standard	Standard
KG 258 Horizon Reference Indicator	—	Standard	Standard
KI 256 Flight Command Indicator	Standard	—	—
Automatic Electric Elevator Trim	Standard	Standard	—
Manual Electric Trim	Standard	Standard	Optional
Yaw Damper	Optional for some aircraft	Optional for some aircraft	—
KA 185 Remote Mode Annunciator	Optional for some aircraft	Optional for some aircraft	Optional for some aircraft
KAS 297B Altitude Preselect/Alerting, Vertical Speed Hold	Optional for some aircraft	Optional for some aircraft	—
FUNCTIONS/MODES			
ALT Hold (ALT)	Yes	Yes	—
ALT Preselect	Optional	Optional	—
Heading Select (HDG)	Yes	Yes	Yes
NAV (VOR/RNAV)	Yes	Yes	Yes
Approach (APR)	Yes	Yes	Yes
Glideslope (GS)	Yes	Yes	—
Back Course (BC)	Yes	Yes	Yes
Control Wheel Steering (CWS)	Standard	Standard	Optional with King manual electric trim
Vertical Speed Hold	Optional	Optional	—
Vertical Trim	Yes	Yes	—
Auto Capture	Yes	Yes	Yes
Auto Track	Yes	Yes	Yes
All Angle Intercept	Yes	Optional (with KI 525A)	Optional (with KI 525A)
Auto 45-degree Intercept	—	Standard (with KG 107)	Standard (with KG 107)
TEST			
Manual and Auto Trim Monitor	Both	Both	Manual Trim Monitor (with King manual electric trim option)
Roll Rate Monitor	Yes	Yes	Yes
Pitch Rate Monitor	Yes	Yes	—

NOTE: The KFC 150, KAP 150 and KAP 100 are designed as independent systems to maximize their individual capabilities. Therefore they are not designed for conversion from one system to another.

IMPORTANT: This Pilot's guide provides a general description of various operational characteristics of the KFC 150, KAP 150 and KAP 100 Flight Control Systems. However, operation of a system should not be attempted without reviewing the specific information in the FAA approved Aircraft Flight Manual Supplement for your particular aircraft type.

SYSTEMS INTEGRATION

The individual systems diagrams on pages 7, 8, and 9, show the components and their relationships in typical KFC 150, KAP 150 and KAP 100 Flight Control Systems. The actual components used on individual aircraft may vary slightly in order to optimize certification and installation requirements.

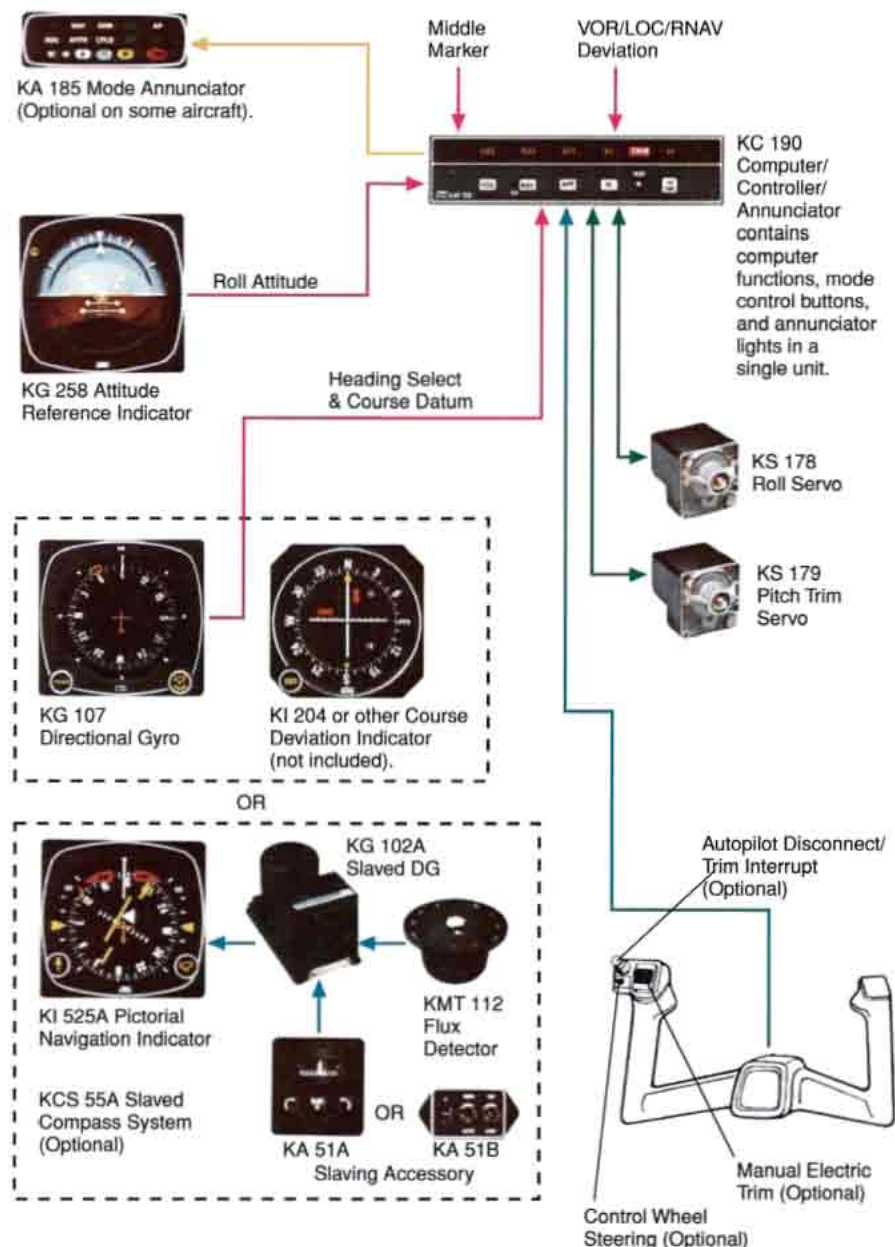
Each system has a number of inputs and outputs: sensor outputs are shown in red; computation inputs shown in blue; display outputs shown in orange; and aircraft control shown in green. The systems diagrams reflect that the KAP 150 and KFC 150 systems control both pitch and roll axes of the aircraft. The KAP 100, being a single-axis system, controls only the roll axis of the aircraft. All sensor information (pitch and roll reference, heading and course datum, RNAV/VOR/LOC/GS deviation and flags, marker receiver and static pressure [altitude] is fed into the system's flight computer).

The flight computer computes pitch and roll steering commands (or in the case of the KAP 100, roll commands only). In the KFC 150 system these commands are routed through the KI 256 Flight Command Indicator (FCI), where they are displayed on the V-Bar as visual guidance commands.

In all three systems these steering commands are fed to the autopilot computation circuits contained in the appropriate flight computer which generates the commands for the individual servos to manipulate the ailerons, elevator and elevator trim. An optional yaw channel is available for some aircraft, but is independent of pitch and roll commands.

Using the same pitch and roll commands in the KFC 150 system for flight director and autopilot provides totally consistent flight director steering command and autopilot control. There is no disagreement in computation. The autopilot simply converts the pitch and roll steering commands from the flight computer, displayed on the V-Bar in the FCI, into the required elevator and aileron position commands. Full integration of flight director and autopilot allows the pilot to delegate the manual effort of flying the aircraft to the autopilot while monitoring its activity with the flight director.

TYPICAL KAP 100 AUTOPILOT SYSTEM



This is a Single-Axis (Roll) System.

DESCRIPTION OF PANEL UNITS



KC 192 Mode Controller/Computer/Annunciator

The KC 192 Mode Controller/Computer/Annunciator for the KFC 150 system incorporates all computer functions, mode control buttons and annunciator lights in a single panel-mounted unit. The KC 192 annunciates all vertical and lateral flight director and autopilot system modes.

In addition, the KC 192 has seven push buttons for engaging flight director and/or autopilot modes, a push button to initiate a system self-test, and a vertical trim rocker switch to allow for changing the aircraft's pitch up or down without disconnecting the autopilot.



KC 191 Mode Controller/Computer/Annunciator

The KC 191 Mode Controller/Computer/Annunciator for the KAP 150 incorporates the functions of a computer, mode controller and annunciator lights in a single, panel-mounted unit. The KC 191 annunciates all vertical and lateral autopilot

system modes. In addition, the KC 191 has six push buttons for engaging autopilot modes, a push button to initiate system self-test, and a vertical trim rocker switch to allow for changing the aircraft pitch up or down without disconnecting the autopilot.



KC 190 Mode Controller/Computer/Annunciator

The KC 190 Mode Controller/Computer/Annunciator for the KAP 100 incorporates the functions of a computer, mode controller and annunciator lights in a single, panel-mounted unit. The KC 190 annunciates all lateral autopilot system

modes. In addition, the KC 190 has five buttons for engaging autopilot modes, and a push button to initiate system self-test.



KI 256 Flight Command Indicator (FCI)

The KI 256 displays the following information:

- Pitch and roll attitude.
- Flight Director pitch and roll commands.
- DH (decision height) annunciation when used with a radar altimeter.

The KI 256 contains an air-driven vertical gyro. Engine(s) must be running, pressure or vacuum system operating and gyro up to speed before the system will operate. Allow three minutes for the gyro to come up to speed.



KG 253 Electric Horizon Reference Indicator

The KG 253 displays the following information:

- Pitch and roll attitude.
- DH (decision height) annunciation when used with a radar altimeter.

The KG 253 is an electric attitude reference indicator. Electrical power (D.C.) must be applied in order for the unit to operate. Immediately following electrical power turn-on, the knob labeled "Pull to Erect" should be pulled out with a moderate, even pull and held in the out position for approximately three seconds. The knob should then be released quickly but smoothly. Erecting the unit should only be accomplished while the aircraft is relatively level on the ground or in level flight. The gyro must be up to speed before the system will operate. Allow three minutes for the gyro to come up to speed.



KG 258 Horizon Reference Indicator

The KG 258 displays the following information:

- Pitch and roll attitude.
- DH (decision height) annunciation when used with a radar altimeter.

The KG 258 contains an air-driven attitude reference indicator. Engine(s) must be running before the system will operate. Allow three minutes for the gyro to come up to speed.



KI 254 Electric Flight Command Indicator (FCI)

The KI 254 displays the following information:

- Pitch and roll attitude.
- Flight Director pitch and roll commands.
- DH (decision height) annunciation when used with a radar altimeter.

The KI 254 contains an electric vertical gyro. Electrical power (D.C.) must be applied in order for the unit to operate. Immediately following electrical power turn-on, the knob labeled "Pull to Erect" should be pulled out with a moderate, even pull and held in the out position for approximately three seconds. The knob should then be released quickly but smoothly. Erecting the unit should only be accomplished while the aircraft is relatively level on the ground or in level flight. The gyro must be up to speed before the system will operate. Allow three minutes for the gyro to come up to speed.



KI 204/206



KG 107



KI 525A



KA 185



KAS 297B

KI 204/206 Course Deviation Indicator

The KI 204/206 displays the following:

- VOR/LOC/GLIDESLOPE Deviations.
- Course Select (OBS).
- TO/FROM Flag Indication.

The KI 204/206 is used with the KN 53, KX 155 or KX 175B, and the KN 75 Glideslope Receiver. The KI 206 is used with the KN 74, KNS 80, KNS 81, KX 165 or KNC 610.

KG 107 Directional Gyro

The KG 107 Directional Gyro displays the following information:

- Unslaved gyro magnetic heading information.
- Selected heading (HDG "bug").

The KG 107 is an air-driven directional gyro indicator. Engine(s) must be running, pressure or vacuum system operating and gyro up to speed before the system will operate. Allow three minutes for the gyro to come up to speed.

KI 525A Horizontal Situation Indicator (HSI)

The KI 525A is the display portion of the KCS 55A Slaved Compass System and displays the following:

- Slaved gyro magnetic heading information.
- Selected heading (HDG "bug").
- VOR/LOC/RNAV course deviation.
- Glideslope deviation.

KA 185 Mode Annunciator (Optional)

The KA 185 provides a parallel annunciation display of all appropriate operating

modes and may be positioned on the panel in the pilot's normal scan.

KAS 297B Altitude Selector (Optional)

The KAS 297B is used with a KEA 130A Altimeter to provide altitude preselect/alerting and vertical speed modes for the KFC 150 and KAP 150 systems.

System Monitor Description

Through the use of extensive monitor circuits in the 100 series flight control systems, safer control of the aircraft is provided, since failures are predominantly "soft" (aircraft control is automatically returned to the pilot when a fault is detected). Because of this safety factor, the 100 series flight control systems are able to provide smoother control of the aircraft due to increased servo authority.

The internal monitors continuously check for the presence of operating pitch and roll microprocessors, adapter modules (used to tailor the autopilot to individual aircraft models), pitch and roll reference signals, proper internal voltages, trim power, "runaway" auto trim, wrong direction of trim, abnormal pitch attitude rates, and abnormal roll attitude rates.

The trip levels for pitch and roll attitude rates and duration are independently set on the adapter modules for each aircraft.

Digital design allows the incorporation of these monitors without the weight and space penalties associated with previous technology systems. Now these important safety features are available to the operators of piston engine aircraft at a reasonable price.

THE KAP 100 AUTOPILOT SYSTEM



The KAP 100 is a single-axis, digital, panel-mounted autopilot designed to incorporate substantial pilot workload relief benefits into a highly affordable system for both light single and twin engine aircraft.

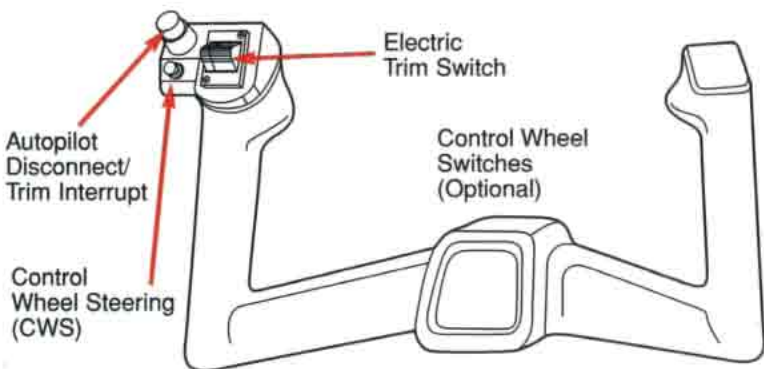
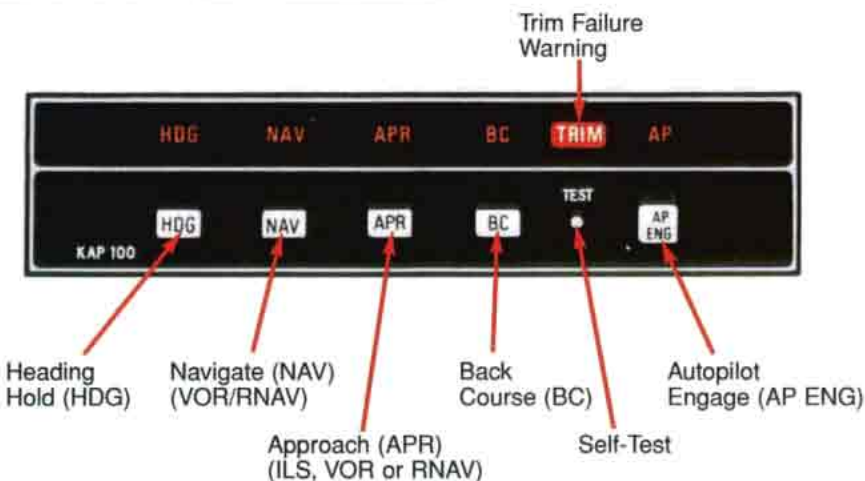
The KAP 100 is capable not only of flying the aircraft in a wings level attitude, but also of intercepting and tracking headings and courses. It can fly all of the lateral modes flown by the KAP 150 including heading hold (HDG), NAV (NAV), approach (APR) and back course (BC).

Like the KAP 150, the KAP 100 comes equipped with the King KG 107 directional gyro as standard equipment, but an optional KCS 55A Compass System with a

KI 525A PNI may be chosen instead. (If you are unfamiliar with the operation of a Pictorial Navigation Indicator (PNI) you should stop here and review the section of the KCS 55A Compass System on page 95.)

The KG 107 is not a slaved system, which means the gyro must be adjusted periodically to correct for precession.

The KG 107 displays aircraft magnetic heading, and radio navigation course information must be read from the associated CDI to monitor the horizontal navigation results of autopilot control movements.



Mode	Autopilot Action
Attitude Reference	Power on and no modes selected. KG 258 displays aircraft attitude and KGS 107 displays unslaved heading. Align heading to magnetic compass by pushing and rotating the knob on the lower left of the KG 107 and update periodically to correct for precession. (With the optional KCS 55A Compass System, a KI 525A PNI is installed in place of the KG 107. The PNI will display slaved aircraft heading and requires no periodic update.)
Autopilot Engage (AP ENG)	Aircraft control surfaces (ailerons) smoothly respond to satisfy the autopilot modes selected by the pilot.

Heading (HDG) _____	Select desired heading on the "bug" on the KG 107 (or optional KI 525A), and the autopilot will turn to and maintain the heading.
Navigate (NAV) _____ (VOR/RNAV)	With a VOR course (or RNAV on RNAV equipped aircraft) selected on the CDI or PNI, the autopilot will intercept and track the appropriate course.
Approach (APR) _____ (ILS, VOR or RNAV)	With an ILS or VOR (or RNAV) course selected on the CDI or PNI, the autopilot will intercept and track the appropriate ILS localizer only, VOR or RNAV course.
Back Course (BC) _____	With the front course ILS set on the CDI or PNI, the autopilot will capture and track a reverse localizer course.
Test Button _____	Depressing the test button initiates a test of the KAP 100 circuitry including operation of the King manual electric trim (if installed). The test must be performed after turn on before the autopilot can be engaged.
Control Wheel _____ Steering (CWS)	This optional feature for the KAP 100 includes a switch mounted on the control wheel which allows you to maneuver the aircraft in the roll axis without disengaging the autopilot. After the CWS switch is released, the autopilot resumes control of the aircraft.

OPERATING THE KAP 100 SYSTEM

When initially powered (no modes selected), the KAP 100 will display aircraft attitude on the KG 258 and unslaved heading on the KG 107. Align heading to the magnetic compass by pushing and rotating the knob on the lower left of the KG 107 and update it periodically to correct for precession.



System Self-Test

The KAP 100 system incorporates a system self-test function which is activated by a test button on the KC 190 Mode Control/Computer/Annunciator. The test must be performed before the autopilot can be engaged. The test determines, before takeoff, that the system is operating normally. To perform the test, momentarily push the test button:

1. All annunciator lights, the trim light and autopilot light will illuminate.
2. The trim light will flash 4 times.*
3. The annunciator legends will go blank, an aural tone will beep (approx. 6 times) and the "AP" light will flash (approx. 12-13 times) and go off. (If the AP light fails to flash you will be unable to engage the autopilot.)
4. The KC 190 display will go blank.

The test checks all digital computing capability, the disconnect capability of the autopilot, and the failure annunciator system. CAUTION: If the trim legend flashes at the end of the test it indicates there is a failure in the King Manual Electric Trim. (See a qualified King Service Agency for repair.)

*On systems with King manual electric trim only.

Attitude Reference Mode Of Operation

The system will be in the basic attitude reference or "gyro" mode with engine(s) running and aircraft power on, but no modes selected (annunciator panel blank). Aircraft heading is shown on the KG 107 and pitch and roll attitude on the KG 258 Horizon Reference Indicator. (When the optional KI 525A PNI is installed in place of the KG 107, aircraft heading will be shown on the KI 525A.)

Attitude Gyro Operation Note: When shutting down the aircraft for short periods of time, make sure the Attitude Gyro has completely spun down before starting operations again. Gyro spin down occurs when the air supply is cut off to the gyro and usually takes about 10 minutes.

During Gyro spin down most gyros have a tendency to "tilt" (precess) to one side. If the air supply is reapplied to the gyro while in this state, slow gyro erection (leveling) will occur due to gyro inertia. If aircraft operations are initiated before the gyro is fully erected, there is a greater possibility that the gyro may tumble causing loss of primary attitude information from the Attitude Gyro.



AUTOPILOT (AP) MODE

NOTE: The autopilot cannot be engaged and used after power has been applied to the system until the system self-test has been performed.

The autopilot provides single axis (roll) stabilization as well as automatic response to all selected autopilot modes.

On initial engagement, with no other autopilot modes selected on the KC 190, the KAP 100 will fly the aircraft wings level.

Warning: Whenever the autopilot is disengaged, the AP legend on the annunciator panel will flash and an aural tone will sound to alert the pilot.

NOTE: For system limitations refer to the Flight Manual Supplement for your particular aircraft.



HEADING SELECT (HDG) MODE

In the heading mode, the autopilot will intercept and 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 KG 107 using the heading select knob. (If the optional KI 525A is installed, set the heading "bug" on it instead.)
2. Depress the HDG button on the KC 190 to engage the heading select mode. With the autopilot engaged, 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 new heading.



(1)



(2)





*The capture point will vary depending on the angle of intercept and the rate of change of VOR/RNAV radials.

(See page 84/85 for illustration)

NAVIGATION (NAV) MODE USING THE KG 107/KI 206 INDICATORS (VOR, RNAV)

In the navigation (NAV) mode the autopilot intercepts and tracks VOR and RNAV courses. To operate in the NAV mode (with the KAP 100 currently in HDG mode):

1. Tune the frequency for the selected VOR (or VORTAC) station. For RNAV, set in the waypoint distance and VORTAC radial.
2. Set the OBS to the desired course.
3. Depress the NAV button on the KC 190. (HDG will remain illuminated and NAV will flash to signify that the NAV mode is armed.)

NOTE: If the NAV mode is selected with the aircraft level within ± 4 degrees and within 2-3 dots of course deviation, NAV arm mode will be bypassed and the NAV mode will engage directly.

4. Within five seconds, move the heading bug on the KG 107 to the same magnetic heading as the selected course on the CDI.
5. The autopilot will fly an automatic 45 degree intercept heading until within the capture zone,* then intercept and fly the desired course. The "HDG" light will go off and the "NAV" light will illuminate steadily as the "NAV" mode goes from arm to engage.
6. The autopilot will bank as necessary to maintain course.

NOTE: You should consider using HDG select mode just prior to VOR station passage. If the autopilot is engaged in NAV mode it may cause erratic maneuvers while following a rapidly changing course deviation needle as the aircraft flies in the cone of confusion.

NOTE: For system limitations refer to the Flight Manual Supplement for your particular aircraft.



NAVIGATION (NAV) MODE USING THE OPTIONAL KI 525A PNI (VOR, RNAV)

In the navigation (NAV) mode, the autopilot intercepts and tracks VOR and RNAV courses. To operate in the NAV mode:

1. Tune the frequency for the selected VOR (or VORTAC) station. For RNAV, set in the waypoint distance and VORTAC radial.
2. Set the desired course on the KI 525A PNI.
3. Establish the desired intercept angle by setting the heading "bug" on the intercept heading and activate HDG mode. The KAP 100 can perform all-angle intercepts when using the KI 525A PNI. (HDG light will illuminate.)
4. Depress the NAV button on the KC 190. (NAV light will flash to signify that NAV mode is armed.)

NOTE: If the NAV mode is selected with the aircraft level within ± 4 degrees and within 2-3 dots of course deviation, NAV arm mode will be bypassed and the NAV mode will engage directly.

5. The autopilot will fly the selected heading until entering the capture zone,* then turn to intercept the selected course. The HDG light will go off and the NAV light will illuminate steadily as the NAV mode goes from arm to engage.
6. The autopilot will bank as necessary to maintain course.

*The capture point will vary depending on the angle of intercept and the rate of change of VOR/RNAV radials.

(See page 86/87 for illustration)



NOTE: You should consider using HDG select mode just prior to VOR station passage. If the autopilot is engaged in NAV mode it may cause erratic maneuvers while following a rapidly changing course deviation needle as the aircraft flies in the cone of confusion.



APPROACH (APR) MODE USING THE KG 107/KI 206 INDICATORS

The approach (APR) mode allows the autopilot to intercept and track ILS localizer, or VOR or RNAV courses. To operate in the APR mode (with the KAP 100 currently in HDG mode):

1. Tune the frequency for the selected ILS, VOR or RNAV approach.
2. Set the OBS to the final approach course (front course for ILS even when flying a reverse course approach).
3. Check the heading displayed on the KG 107 against the magnetic compass and reset if necessary.
4. Depress the "APR" button on the KC 190 (HDG will remain illuminated and APR will flash to signify that APR mode is armed).

NOTE: If the APR mode is selected with the aircraft level within ± 4 degrees and within 2-3 dots of course deviation, APR arm mode will be bypassed and the APR mode will engage directly.

5. Within five seconds, move the heading "bug" on the KG 107 to the same magnetic heading as the selected course on the CDI.
6. The autopilot will fly an automatic 45 degree intercept heading until within the capture zone, then intercept and fly the desired course. The "HDG" light will go off and the "APR" light will illuminate steadily as the APR mode goes from arm to engage.
7. The autopilot will bank as necessary to maintain the localizer or approach course.

NOTE: For system limitations refer to your Flight Manual Supplement.

(See page 80/81 for illustration)



APPROACH (APR) MODE USING THE OPTIONAL KI 525A PNI

The approach (APR) mode allows the autopilot to intercept and track ILS (localizer only), VOR and RNAV courses. To operate in the APR mode:

1. Tune the frequency for the selected ILS, VOR or RNAV approach.
2. Set the final approach course on the KI 525A PNI.
3. Establish the desired intercept angle by setting the heading "bug" on the intercept heading and activate the HDG mode.
4. Depress the "APR" button on the KC 190 (APR light will flash to signify that APR mode is armed).

NOTE: If the APR mode is selected with the aircraft level within ± 4 degrees and within 2-3 dots of course deviation, APR arm mode will be bypassed and the APR mode will engage directly.

5. The autopilot will fly the selected heading until entering the capture zone, then turn to intercept the course. The "HDG" light will go off and the "APR" light will illuminate steadily as the APR mode goes from arm to engage.
6. The autopilot will bank as necessary to maintain course.

(See page 82/83 for illustration)





BACK COURSE (BC) MODE USING THE KG 107/KI 206 INDICATORS

In the back course (BC) mode the autopilot intercepts and tracks a reverse course ILS. To operate in the BC mode (with the KAP 100 currently in the HDG mode):

1. Tune the frequency for the selected ILS back course.
2. Select the back course mode by either depressing the APR button and then the BC button, or by merely depressing the BC button itself.
3. Within five seconds, move the heading "bug" on the KG 107 to the same magnetic heading as the selected front course (090 degrees in this example). The "HDG" light will remain illuminated, and the "APR" light will flash to signify that the APR mode is armed.

NOTE: If the BC APR mode is selected with the aircraft level within ± 4 degrees and within 2-3 dots of course deviation, BC APR arm mode will be bypassed and the BC APR mode will engage directly.

4. The autopilot will fly an automatic 45 degree intercept heading until within the capture zone, then intercept and fly the desired course, which will be a reciprocal to the front course. The "HDG" light will go off and the "APR" light will illuminate steadily as the BC mode goes from arm to engage.
5. The autopilot will bank as required to maintain course. Automatic crosswind compensation will provide precise tracking.

NOTE: For system limitations refer to your Flight Manual Supplement.

(See page 76/77 for illustration)



BACK COURSE (BC) MODE USING THE OPTIONAL KI 525A PNI

In the back course (BC) mode the autopilot intercepts and tracks a reverse course ILS. To operate in the BC mode:

1. Tune the frequency for the selected ILS back course.
2. BE CERTAIN TO SET IN THE ILS FRONT COURSE EVEN THOUGH YOU WILL BE FLYING A RECIPROCAL HEADING ON AN ILS BACK COURSE APPROACH. FOR EXAMPLE, A BC APPROACH MIGHT HAVE A FRONT COURSE OF 090 DEGREES WHICH YOU WILL SET IN AS YOU FLY A BACK COURSE HEADING OF 270 DEGREES TO RUNWAY 27.
3. Establish the desired intercept angle by setting the heading "bug" on the intercept heading and activate the HDG mode. ("HDG" light will illuminate.)
4. Select the back course mode by either depressing the "APR" button and then the BC button, or by merely depressing the BC button itself. (HDG will remain illuminated, BC will illuminate, and APR will flash to signify that APR mode is armed.)

NOTE: If the BC APR mode is selected with the aircraft level within ± 4 degrees and within 2-3 dots of course deviation, BC APR arm mode will be bypassed and the BC APR mode will engage directly.

(See page 78/79 for illustration)

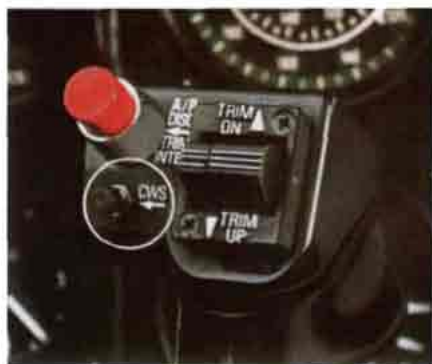


5. The autopilot will fly the selected heading until entering the capture zone, then turn to intercept the course. The "HDG" light will go off and the "APR" light will illuminate steadily as the BC mode goes from arm to engage.
6. The autopilot will bank as required to maintain course. Automatic crosswind compensation will provide precise tracking.



MANUAL ELECTRIC TRIM (OPTIONAL)

Manual electric trim can be obtained as an option with the KAP 100. This will make it easier for the pilot to trim off elevator control surface pressures.



CONTROL WHEEL STEERING (CWS) MODE (OPTIONAL)

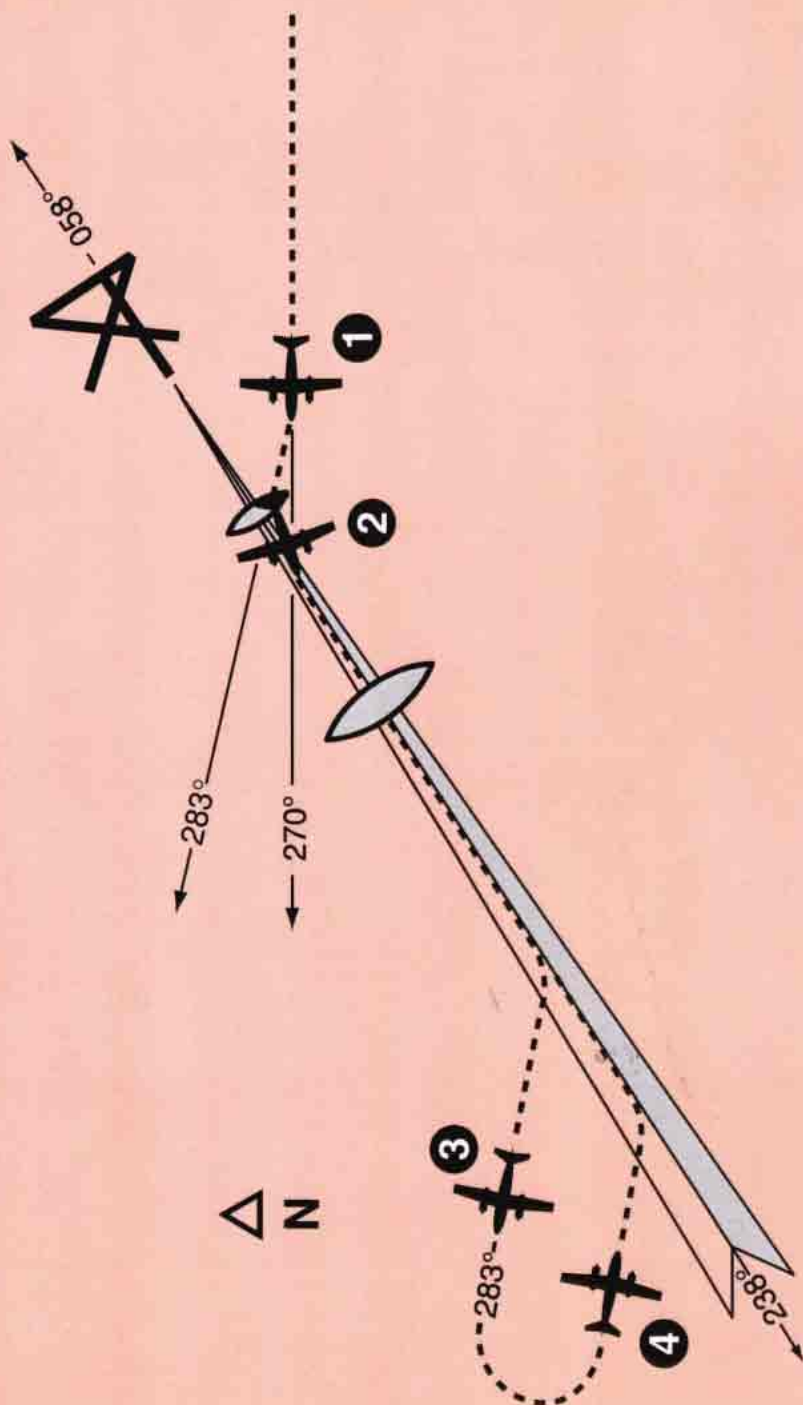
Control wheel steering is included as part of the King Manual Electric Trim option with the KAP 100. It allows the pilot to maneuver the aircraft in the roll axis without disengaging the autopilot.

To use control wheel steering (CWS), depress the CWS button on the yoke. This releases the autopilot roll servo and allows you to assume manual control while the autopilot functions are placed in a synchronization state. This means that when you release the CWS button, the autopilot will smoothly resume control of the aircraft and fly it to the lateral command you were using prior to engaging CWS.

NOTE: For system limitations refer to your Flight Manual Supplement.

OPERATIONS WITH THE KAP 100

Outbound On Front Course For Procedure Turn To ILS Approach (KG 107 & KI 206)





1. The aircraft is heading 270 degrees with heading (HDG) mode and autopilot (AP) engaged. To intercept and fly the ILS front course outbound, set the front course on the OBS and depress the approach (APR) button and the reverse course (BC) button (or just the BC button alone). Move the heading "bug" within five seconds to the front course (058 degrees). The autopilot will turn 45 degrees to intercept the localizer signal. In this case, the aircraft will turn to 283 degrees.

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

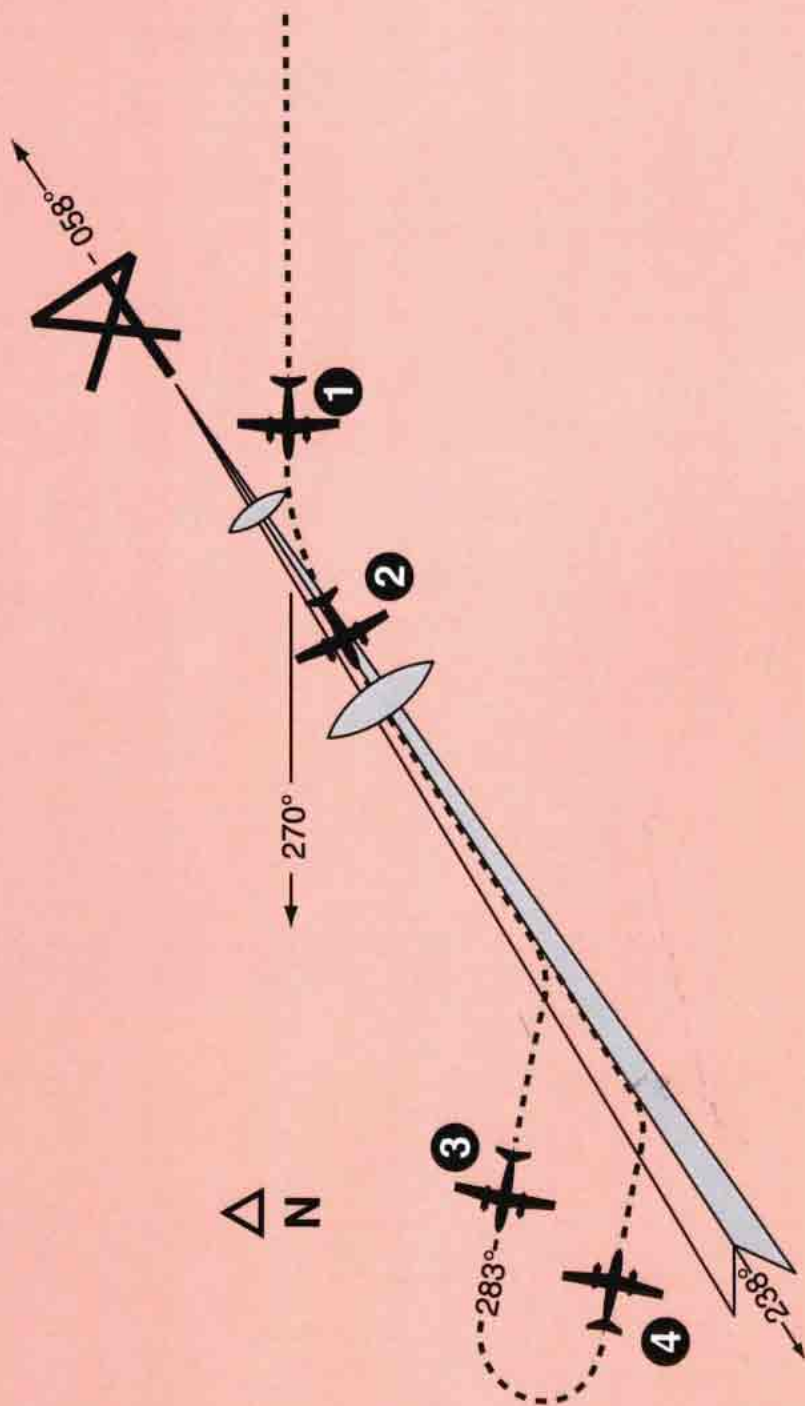
Note that the left-right deviations of the CDI course deviation needle are reversed (you must turn right to center a deviation of the index to the left). This needle reversing takes place because you are flying outbound on a front course.

3. 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 degree angle on a selected heading of 283 degrees.

4. Now you have reset the heading "bug" to 103 degrees and made a 180 degree turn to this heading. This 103 degree heading will intercept the front course of 058 degrees. You must now reselect the approach mode by depressing the "APR" button on the mode controller.* The "APR" light will begin to flash signifying the approach mode is armed. Move the heading bug within five seconds to the front course (058 degrees). Since the 45 degree intercept is 103 degrees, the aircraft will not turn until the front course is captured.

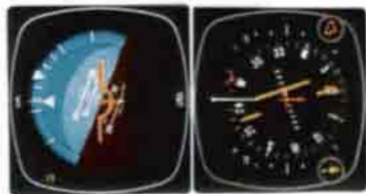
*Check the heading displayed on the KG 107 against the magnetic compass and reset if necessary.

Outbound On Front Course For Procedure Turn (KI 525A)

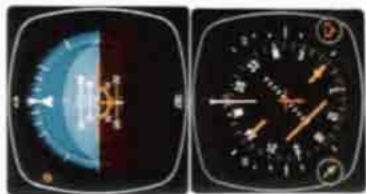




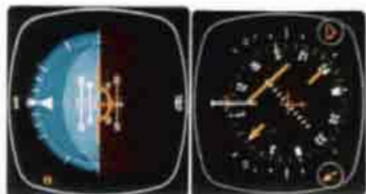
1. The aircraft is heading 270 degrees with heading (HDG) mode and autopilot (AP) engaged. To intercept and fly the ILS front course outbound, set the front course on the PNI and depress the approach (APR) button and the reverse course (BC) button (or just the BC button alone). The back course (BC) mode is selected to go outbound on the front course. The capture point is now being computed, based on closure rate.



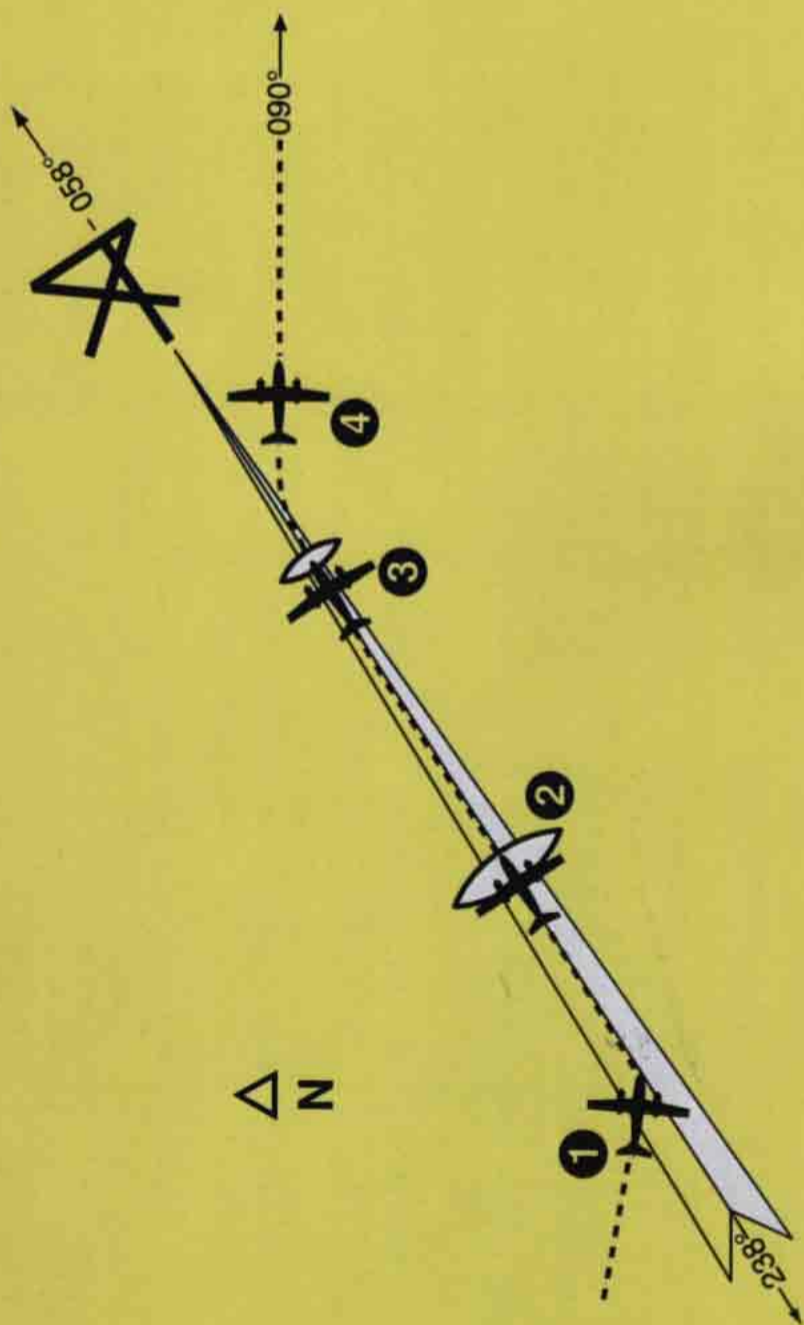
2. When the computed capture point is reached, HDG mode is cancelled and approach mode is automatically activated and a left turn outbound on the localizer is initiated by the autopilot. Note that the left-right deviations of the PNI course needle operate just as though you were flying a front course approach.



3. During the procedure turn outbound, the deviation bar shows pictorially that the aircraft is flying away from the localizer centerline at a 45 degree angle on a selected heading of 283 degrees.

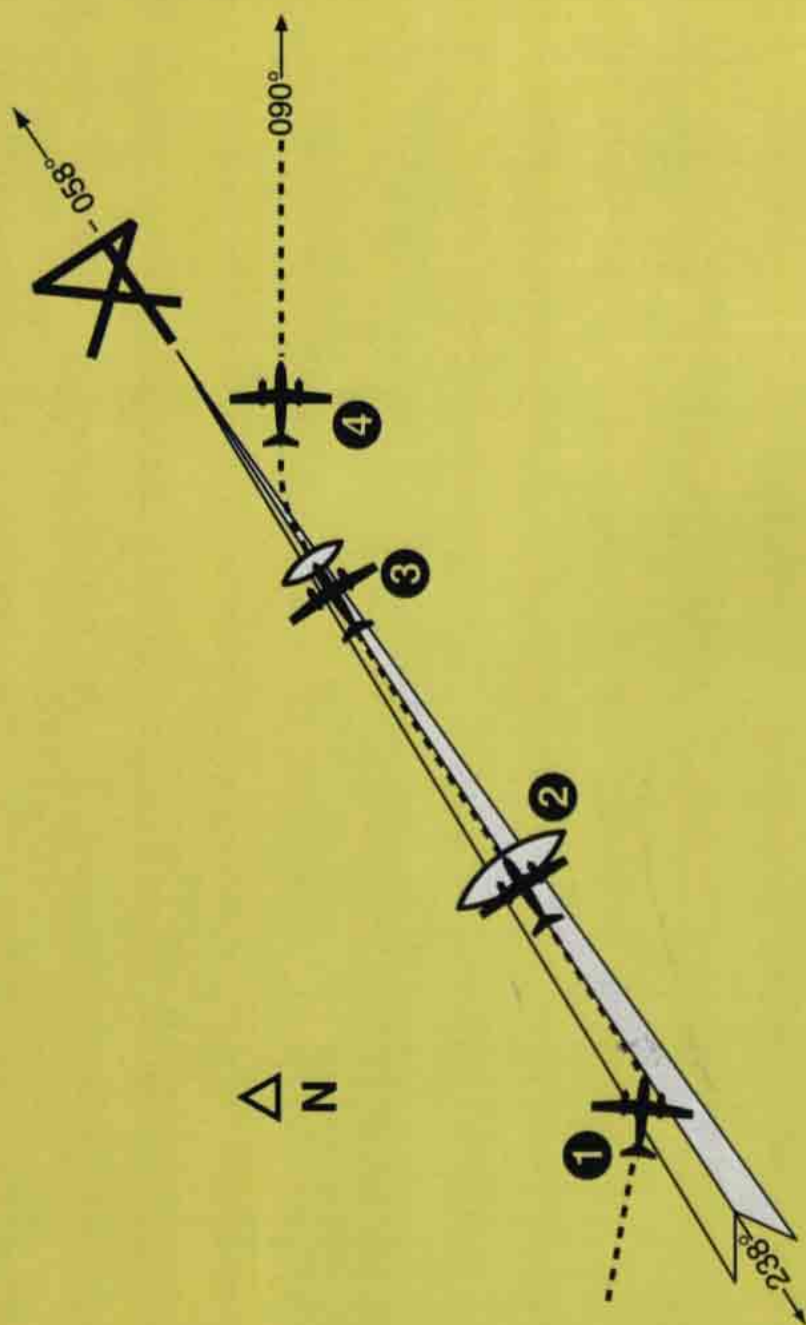


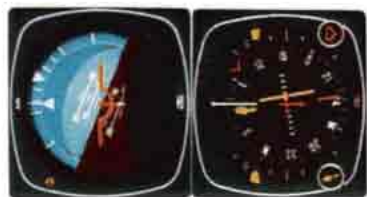
4. Now you have reset the heading "bug" to 103 degrees and made a 180 degree turn to this heading. This 103 degree heading will intercept the front course of 058 degrees. You must now reselect the approach mode by depressing the "APR" button on the mode controller. The "APR" light will begin to flash signifying the approach mode is armed. Automatic capture of the localizer will occur.



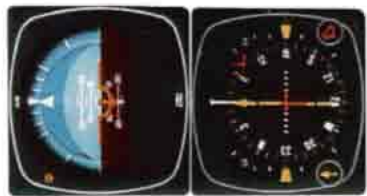


1. Continuing the maneuver on page 77, APR coupling occurs ("APR" light comes on steady, "HDG" light goes off). The autopilot will roll the aircraft out on localizer and the course index will center.
2. The autopilot is following the localizer. At the outer marker, the glideslope deviation needle is at midscale. The autopilot will make bank changes as necessary to maintain localizer (glidepath is manually maintained by the pilot).
3. At the middle marker, the autopilot is disconnected with the button on the KC 190 (or on the control wheel if equipped with the optional King manual electric trim). This cancels all operating autopilot modes. The pilot initiates a missed approach.
4. The heading "bug" has been set to the missed approach heading, 090 degrees. Engaging the autopilot and activating the "HDG" mode causes the autopilot to commence a right turn to a heading of 090 degrees. Pitch attitude during climbout is manually controlled by the pilot.





1. Continuing the maneuver on page 79, APR coupling occurs ("APR" light comes on steady, "HDG" light goes off). The autopilot will roll the aircraft out on localizer and the course index will center.



2. The autopilot is following the localizer. At the outer marker, the glideslope deviation needle is at midscale. The autopilot will make bank changes as necessary to maintain localizer. Glideslope is manually maintained by the pilot.



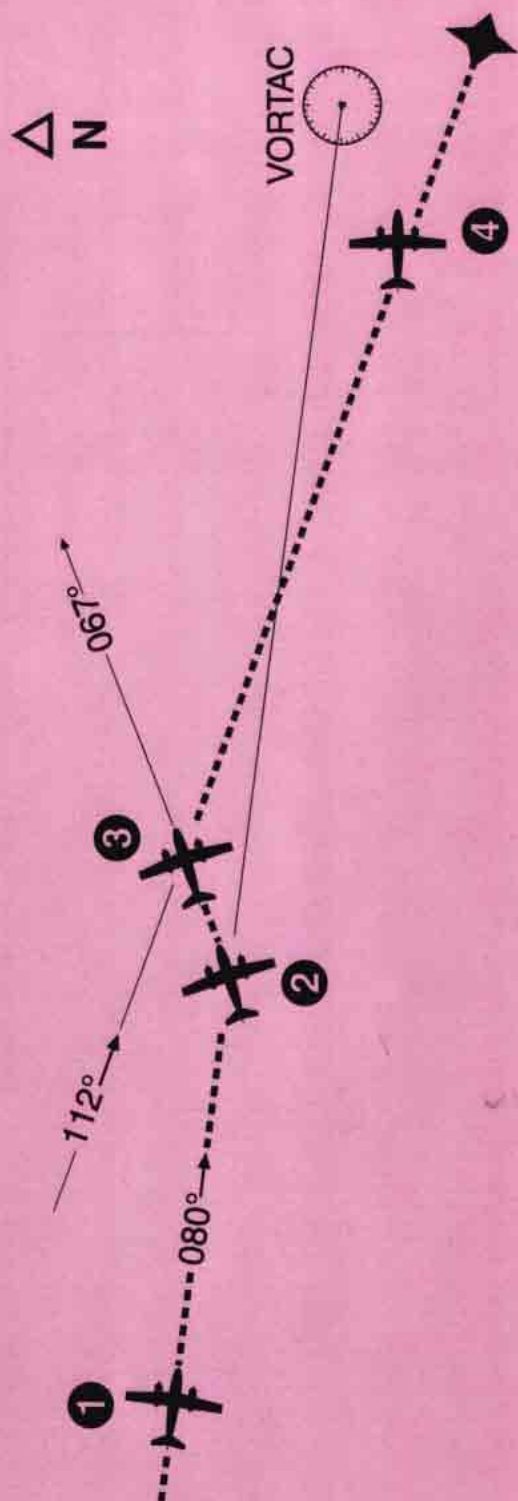
3. At the middle marker, the autopilot is disconnected with the button on the KC-190 (or on the control wheel if equipped with the optional King manual electric trim). This cancels all operating autopilot modes. The pilot initiates a missed approach.



4. The heading "bug" has been previously set to the missed approach heading, 090 degrees. Engaging the autopilot and activating the "HDG" mode causes the autopilot to commence a right turn to a heading of 090 degrees. Pitch attitude during climbout is manually controlled by the pilot.



4. The heading "bug" has been previously set to the missed approach heading, 090 degrees. Engaging the autopilot and activating the "HDG" mode causes the autopilot to commence a right turn to a heading of 090 degrees. Pitch attitude during climbout is manually controlled by the pilot.

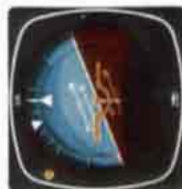




1. The aircraft is flying an OMNI airway in HDG mode on a heading of 080 degrees.



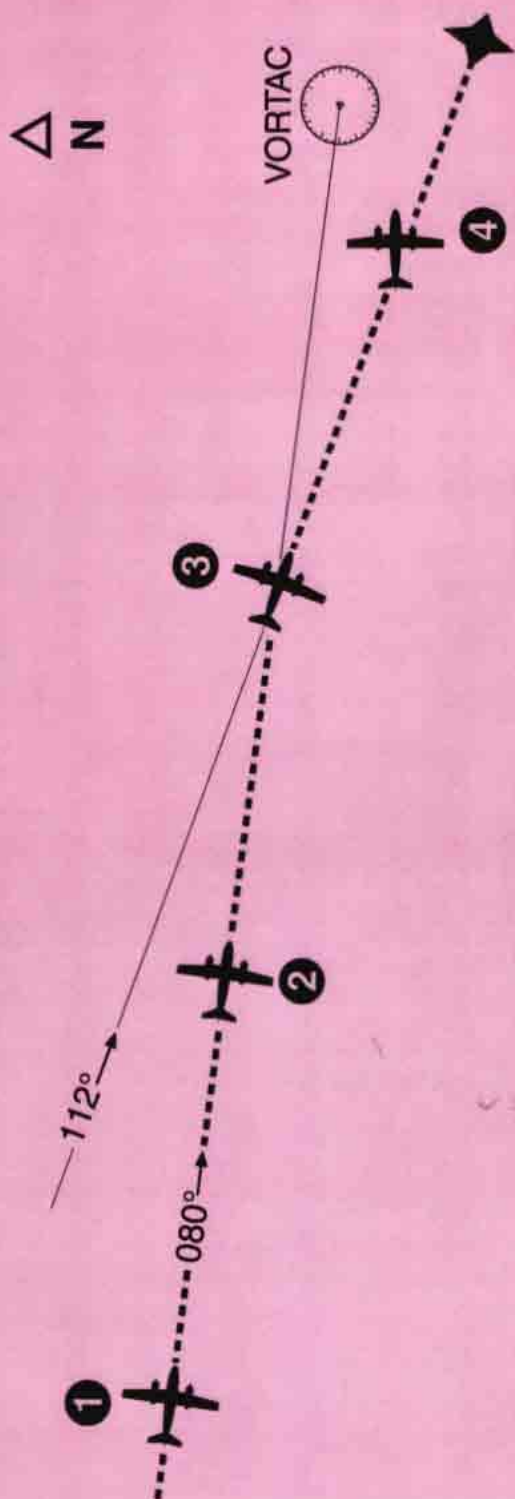
2. A waypoint has been established and the RNAV computer is in enroute mode. A 112 degree course to the waypoint has been selected and "NAV" button pushed "on". The "NAV" light is flashing to signify that the NAV mode is armed. Move the heading bug within five seconds to 112 degrees and the autopilot will set up a 45 degree intercept (067 degrees) until the capture zone is entered and NAV mode is engaged. The capture point is now being computed based on closure rate.

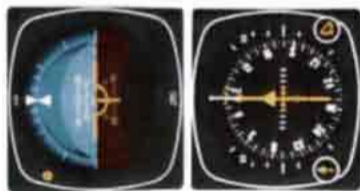


3. The capture sequence starts when NAV mode is automatically engaged canceling the NAV/ARM and HDG modes. The autopilot is turning the aircraft right.



4. The aircraft has completed its turn to the 112 degree course. A wind correction produces an aircraft heading of 105 degrees, displaying a seven degree "crab" angle to maintain the 112 degree RNAV course.





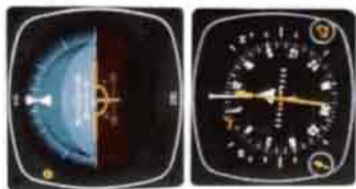
1. The aircraft is flying an OMNI airway in HDG mode on a heading of 080 degrees.



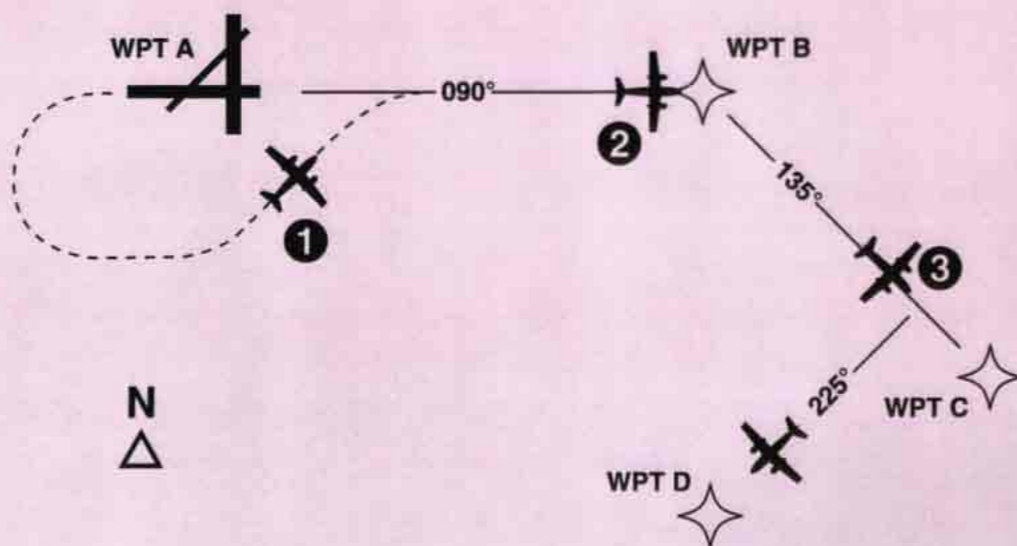
2. A waypoint has been established and the RNAV computer is in enroute mode. A 112 degree course to the waypoint has been selected and "NAV" button pushed "on". The "NAV" light is flashing to signify that the NAV mode is armed. The autopilot is still following the heading select mode on 080 degrees and will do so until the capture zone is entered and NAV mode is engaged. The capture point is now being computed based on closure rate.



3. The capture sequence starts when NAV mode is automatically engaged canceling the NAV/ARM and HDG modes. The autopilot is turning the aircraft right.



4. The aircraft has completed its turn to the 112 degree course. A wind correction produces an aircraft heading of 105 degrees, displaying a seven degree "crab" angle to maintain the 112 degree RNAV course.



Objective: Intercept the desired course and complete a "direct to" operation after passing waypoint "B" while coupled to a Long Range Nav.



1. The aircraft is engaged in Heading (HDG) and Altitude Hold (ALT) mode. A flight plan from waypoint "A" to "B" to "C" is entered in the Long Range Nav. NAV Arm is activated by pressing the NAV button. The Heading Bug, which acts as the course pointer, is then selected within five seconds to 090°. The autopilot commands a 045° intercept until coupled. Upon coupling, the autopilot tracks the Long Range Nav.

2. As the aircraft crosses waypoint "B", the Heading Bug, which acts as the course pointer in NAV mode, must be rotated to reflect the course or bearing to the new active waypoint (135° in this case).

3. The aircraft changes the active waypoint "D" via a "direct to" operation with the Long Range Nav. The Heading Bug must be rotated to 225° to reflect the bearing to "D". The autopilot will then correctly track the course to waypoint "D".

NOTE: In order for the KAP 100 to track the course in NAV mode, the heading bug on the KG 107 must be set at the Desired Track or OBS setting indicated by the Long Range Nav. Moving the OBS on the CDI does not affect movement or location of the Left/Right D-Bar, but only provides a course reference.

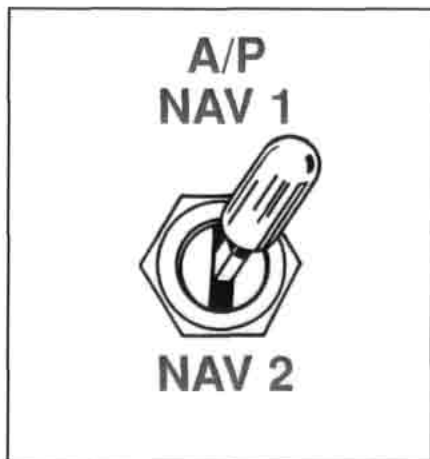
OPTIONAL NAV 1/NAV 2 SWITCHING

It is possible to obtain an optional NAV 1/NAV 2 switching system for the KFC 150, KAP 150 or KAP 100 to allow the autopilot to fly sensor information from either the Number 1 VOR/ILS/RNAV navigation radio or the Number 2 VOR/ILS/RNAV navigation radio.

With the switch installed on the cockpit panel, the pilot merely flips the switch if he wants to have the autopilot fly information from the Number 2 radio. This may be particularly helpful if either the Number 1 or Number 2 radio should fail.

When installed with a 100 series flight control using the KCS 55A compass system, a special status KI 525A PNI and a special status CDI are required. When using the number 2 system always set the OBS to the desired course. This includes setting the front course heading for either ILS Front or Back Course approaches.

When installed with a 100 series flight control using the KG 107, no special status CDI's are necessary.



SYSTEM WEIGHT AND POWER REQUIREMENTS

	Weight		Volt/Amps
	(lbs)	(kgs)	
KAP 100 (with KG 107)	10.93	4.96	14/3.1 28/1.6
KAP 100 (with KCS 55A)	17.73	8.04	14/6.1 28/3.2
Additional for Manual Electric Trim	3.40	1.54	14/1.0 28/0.5
KAP 150 (with KG 107)	18.05	8.19	14/5.1 28/2.5
KAP 150 (with KCS 55A)	24.85	11.27	14/8.1 28/4.1
KFC 150	25.25	11.45	14/8.7 28/4.4
Additional for 3rd axis* (yaw damper)	4.49	2.04	14/2.2 28/1.1
Additional for Altitude/ Vertical Speed Preselect	3.00	1.32	14/0.5 28/0.4

*To add 3rd axis to a system without KCS 55A, additional AC power (inverter) is required.

In keeping with Honeywell's policy of continual product improvement, design and specifications described herein may be altered without notice.

BENDIX/KING WARRANTY SERVICE

Warranty service for your Bendix/King KFC 150, KAP 150 or KAP 100 is available at hundreds of Bendix/King Authorized Sales and Service Centers throughout the world. These Authorized Service Centers are carefully selected for their technical competence and total support capabilities. Each is specially equipped and trained to insure that the highest standards in customer service are maintained.

Only these qualified Bendix/King Sales and Service Centers are authorized to perform a warranted installation of your Bendix/King system—or to provide service under the Bendix/King Warranty.

Upon completion of your aircraft's flight control installation, you will be provided with a warranty information packet which lists the model, serial number and warranty expiration date for each unit of Bendix/King equipment installed.

This Bendix/King warranty is honored by Bendix/King Service Centers throughout the world. Keep your Bendix/King Warranty packet in your airplane at all times to verify your warranty status at any Bendix/King Service Center. It's your key to outstanding warranty service protection.

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