PILOT'S GUIDE

FOR THE KING KAP/KFC 200 FLIGHT CONTROL SYSTEMS

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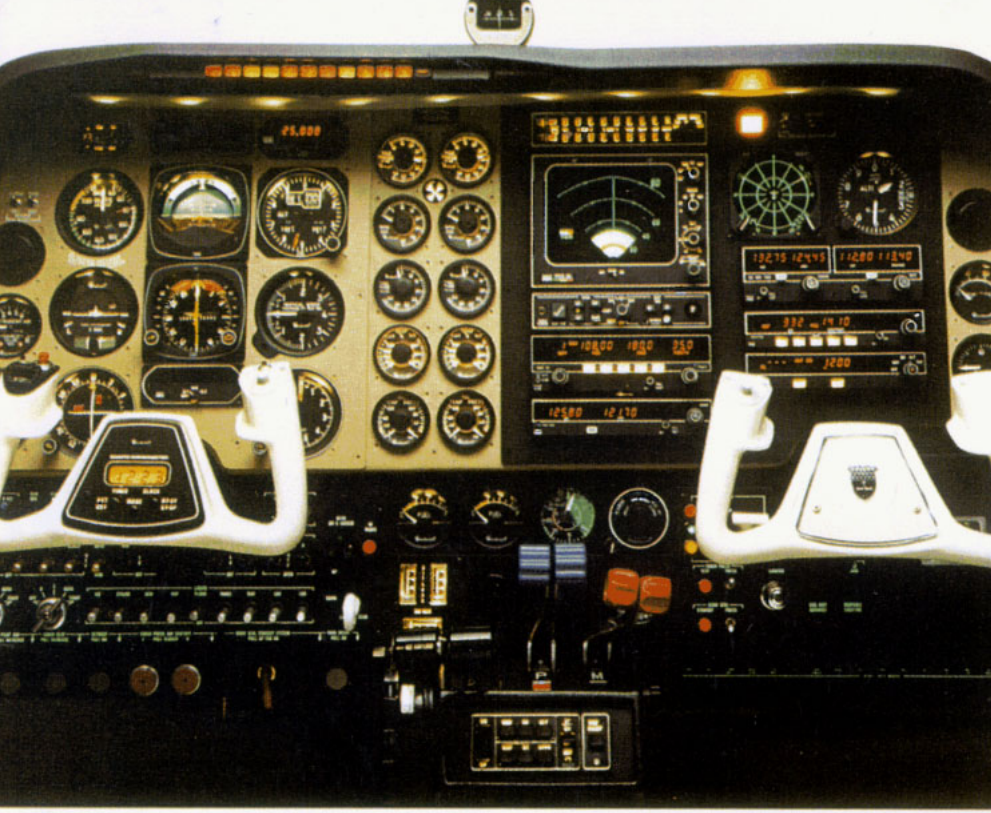
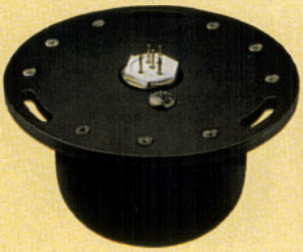


The pressures of single-pilot instrument flying in today's busy air traffic environment can place some very critical demands on your skill and concentration.

To help you stay on top of the situation, King has designed the KAP/KFC 200 systems to provide affordable flight control sophistication for your high-performance single or piston twin.

In this Pilot's Guide you'll find answers to most of your questions regarding the performance capabilities and basic operational requirements of these advanced-design King systems.

IMPORTANT: This Pilot Guide provides a general description of the various operational characteristics of the KAP/KFC 200 Flight Control Systems. However, operation of these systems should not be attempted without first reviewing the specific information in the FAA approved Aircraft Flight Manual Supplement for your particular aircraft type.



KING KCS 55A COMPASS SYSTEM

The KCS 55A Compass System, which includes the KA 51B Slaving Control and Compensator Unit, the KMT 112 Magnetic Slaving Transmitter and the KG 102A Directional Gyro as well as the KI 525A Pictorial Navigation Indicator is an integral part of both the KAP 200 and KFC 200 systems.

The panel-mounted KI 525A PNI combines the display functions of both the standard Directional Gyro and the Course Deviation Indicator's VOR/LOC/Glideslope information to provide the pilot with a single visual presentation. of the complete navigation situation. Thus, it greatly simplifies course orientation, interception and tracking, while eliminating the need for scan coordination between two separate indicators.

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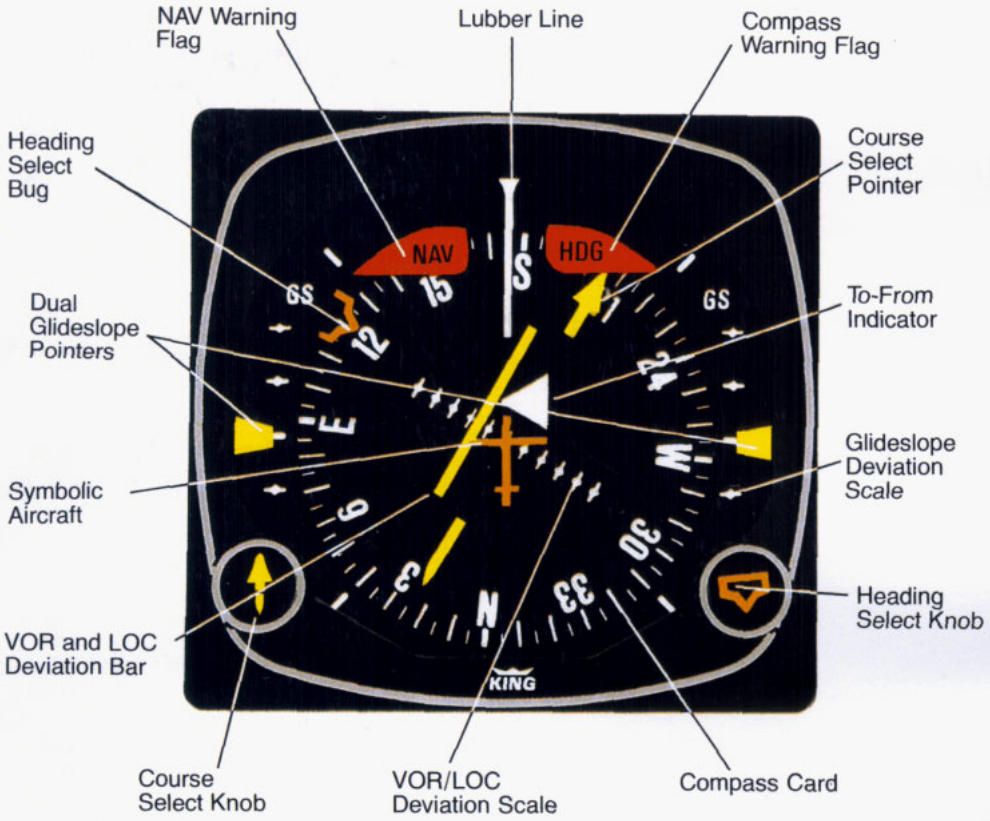


THE KI 525A INDICATOR

The KI 525A Pictorial Navigation Indicator is the panel display for the KCS 55A Compass System. It replaces the standard directional gyro and course deviation indicator (CDI) in the aircraft's panel, combining slaved heading and VOR/LOC/Glideslope deviation information into one compact display. By providing a simple, comprehensive visual presentation of the aircraft's heading and position in relation to a desired course, the pilot's navigation workload is considerably reduced.

DESCRIPTION OF INDICATOR AND DISPLAY FUNTIONS

Compass Card—Responding to the input from the slaved directional gyro, this card rotates within the display so that the aircraft heading is always at the top, under the lubber line.

Lubber Line—A fixed white marker at the top of the display that indicates aircraft magnetic heading on the compass card.

Symbolic Aircraft—A fixed representation of the actual aircraft. This miniature aircraft always points toward the top of the display and the lubber line.

Selected Course Pointer—On this two-part arrow, the "head" indicates the desired VOR or Localizer course and the "tail" indicates the reciprocal. This pointer is set by rotating the course select knob.

Course Select Knob—Used to rotate the course pointer to the desired course on the compass card. This knob corresponds to the Omni Bearing Selector (OBS) on standard NAV indicators.

VOR/RNAV and LOC Deviation Bar—This bar corresponds to the "left/right" needle on standard course deviation indicators. When the aircraft is precisely on the VOR radial or Localizer course, it forms the center section of the selected course pointer and will be positioned under the symbolic aircraft. When off course or approaching a new course, it will move to one side or the other. Since the entire VOR and Localizer display rotates with the compass card, the angular relationship between the deviation bar and the symbolic aircraft provides a pictorial symbolic display of the aircraft's position with respect to the selected course.

Deviation Scale—When tuned to a VOR frequency, each white dot represents 2° of deviation left or right of course. When tuned to a Localizer, the deviation is ½° per dot. In RNAV "APPR" mode the scale is ¼ nm per dot. In RNAV "ENROUTE" mode the scale is 1 nm per dot.*

**This is true of all King and most other RNAV systems.*

Heading Select Bug—A movable orange marker on the outer perimeter of the display, used primarily to select the desired heading you wish to fly. This desired heading is coupled to the KAP 200 Autopilot or KFC 200 Flight Director to provide the "Heading Select" function.

Heading Select Knob—Used to rotate the heading select bug to a desired point on the compass card.

To-From Indicator—A white triangle near the center of the display that indicates, with reference to the OBS setting, whether the course selected is "to" or "from" the selected VOR station and/or RNAV waypoint.

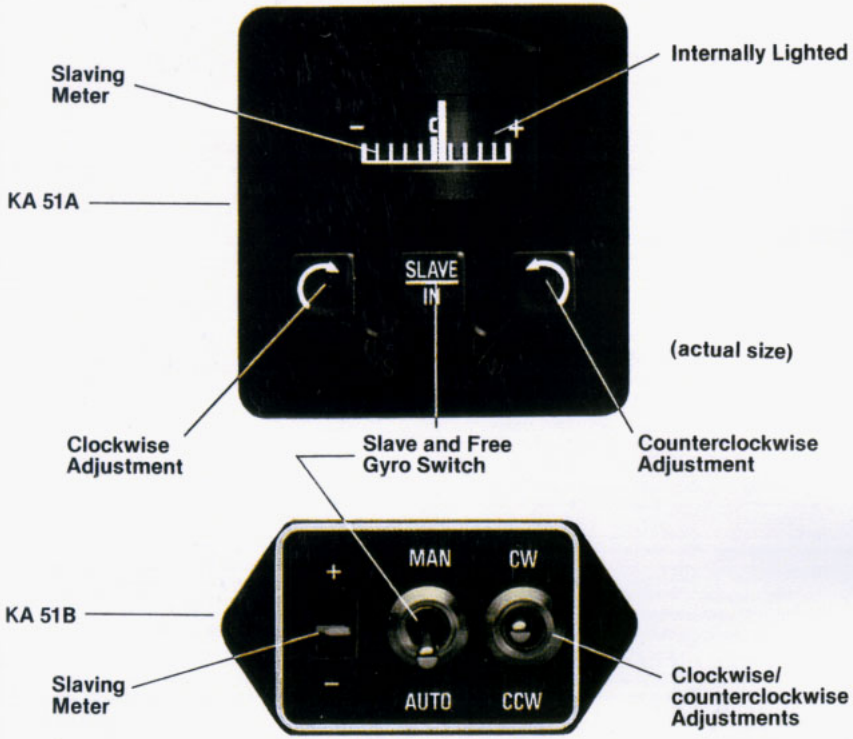
Dual Glideslope Pointers—Chartreuse triangular pointers on either side of the display drop into view when a usable Glideslope signal is received and retract out of view when the Glideslope signal becomes marginal. During an ILS approach, these pointers represent the vertical orientation of the aircraft with respect to the center of the Glideslope beam. When on Glideslope, the pointers will align with the center markers on the Glideslope scale.

Glideslope Deviation Scale—White dots on each side of the display which, in conjunction with the Glideslope pointers, indicate either "above", "below", or "on Glideslope" during an ILS approach.

Compass Warning Flag—A red flag labeled "HDG" becomes visible in the upper right quadrant of the display whenever the electrical power is inadequate or the directional gyro is not up to speed. Compass failures can occur which will not be annunciated by the "HDG" flag. Therefore, periodic comparison with the standby compass is advised.

NAV Warning Flag—A red flag labeled "NAV" becomes visible in the upper left quadrant of the display whenever a usable VOR or Localizer signal is not being received. If RNAV is installed and the system is in RNAV mode, both VOR and DME must be usable before the NAV flag will disappear.

THE SLAVING METER



Slaving Meter–This meter indicates any difference between the displayed heading and the magnetic heading. Right or up deflection indicates a clockwise error of the compass card. Left or down deflection indicates a counterclockwise error of the compass card. Whenever the aircraft is in a turn and the card rotates, it is normal for this meter to show a full deflection to one side or the other.

NOTE: During level flight it is normal for the meter needle to continuously move from side to side and to be fully deflected during a turn. If the needle stays fully deflected, left or right, during level flight, the free gyro mode can be used to center it, as described below.

Slave and Free Gyro Switch (KA 51A)–When depressed, the system is in the slaved gyro mode. When the button is in the outer position (not engaged) the system is in the free gyro mode. (KA 51B)–Operation is identical except switch is pulled and moved to the appropriate position.

Clockwise Adjustment (KA 51A)–When the system is in the free gyro mode, depressing the clockwise manual heading drive button will rotate the compass card to the right to eliminate left compass card error (KA 51B)–Operation is identical except switch is held to clockwise position.

Counterclockwise Adjustment (KA 51A) When the system is in the free gyro mode, depressing the counterclockwise manual heading drive button will rotate the compass card to the left to eliminate right compass card error. (KA 51B)–Operation is identical except switch is held to counterclockwise position.

The KA 51B Control and Compensator Unit is a smaller slaving accessory which has replaced the KA 51A. The KA 51B can be mounted either vertically or horizontally, and provides all the slaving modes and capabilities of the larger KA 51A.

OPERATING

1. Until power is applied to the KCS 55A System, and the directional gyro is up to speed, a red flag labeled "HDG" will be visible in the upper right quadrant of the KI 525A Indicator. In operation, this warning flag will be visible whenever the power being supplied is inadequate or the gyro is not up to speed.

2. With the application of power to the KCS 55A System, and gyro up to operating speed, the red "HDG" flag should disappear from view.

3. If the KCS 55A System is in the slaved gyro mode, the compass card will automatically fast slave at the rate of 180 degrees per minute toward the aircraft's magnetic heading. (Immediately after applying power, this compass card movement should be quite visible.) It will continue to fast slave until the proper magnetic heading is indicated, after which it will slave at a constant rate of 3 degrees per minute to keep the system aligned with the earth's magnetic field.

Under some conditions it is possible for the system to stop slaving exactly 180° from the correct heading. If this should occur, move the Man/Auto switch to the Man position. Rotate the compass card ± 10° from the incorrect heading by holding the CW/CCW switch to one side, and then return the system to slaved operation by moving the Man/Auto switch back to the Auto position. The system will then slave to the correct heading.

4. For free gyro operation, check the slaving meter to determine whether there is right or left deflection. Then hold the CW/CCW switch to center the needle and properly align the system with the earth's magnetic field. A check with the standby compass is recommended to assure there is approximate agreement.

5. Until a usable navigation signal is being received by the KCS 55A system, a red flag labeled "NAV" will be visible in the upper left quadrant of the KI 525A Indicator. In operation, this warning flag should be visible whenever an inadequate navigation signal is being received.

6. For normal navigation to or from a VOR or VORTAC, set the NAV receiver to the desired VOR or VORTAC frequency and the red navigation flag (NAV) should disappear from view if a usable signal is being received.

7. Rotate the course select knob to position the course pointer to the desired VOR course.

8. The VOR deviation bar represents the selected course and the relationship of this bar to the symbolic aircraft in the center of the instrument visually presents the actual relationship of the selected course to your aircraft heading. (In other words, if the symbolic aircraft on the display indicates approaching the deviation bar at 45°, that is the angle at which your aircraft is actually approaching the selected course.)

9. To prepare for an ILS approach, tune the NAV receiver to the desired Localizer frequency. If a usable Localizer signal is being received, the NAV warning flag will disappear.

10. For a front or back course approach, rotate the course select knob to set the course pointer on the **inbound** Localizer course. As with normal navigation (#6 above), the LOC deviation bar represents the desired course. The relationship between this bar and the symbolic aircraft gives a true picture of your

aircraft's position with respect to the Localizer course. Always setting the course pointer to the inbound Localizer course provides the correct deviation bar sensing whether flying a front or back course approach.

11. The Glideslope Deviation pointers should become visible on both sides of the display when a usable Glideslope signal is received. If they do not come into view, a usable Glideslope signal is not being received.

12. The Glideslope pointers indicate the relative position of the Glideslope path with respect to the aircraft. (In other words, if the pointers are above the center marker, the aircraft is below the Glideslope.)

Abnormal Circumstances

- If the Warning Flag (HDG) appears during operation, the compass card indications will be in error. Power may be removed from the KG 102A Directional Gyro by pulling the appropriate circuit breaker. The Selected Course, VOR/LOC Deviation Bar, the NAV flag, and the To/From Indicator will remain in operation.

- If the Navigation Warning Flag (NAV) appears during operation, there are several possibilities: (1) the NAV receiver is not turned on, (2) the NAV receiver is improperly tuned, (3) the ground VOR or LOC station is malfunctioning, (4) the aircraft is out of range of the selected ground station, (5) the aircraft NAV receiver has malfunctioned. (The compass card will continue to display the aircraft heading even if a usable NAV signal is not being received.) (6) If in RNAV mode the DME has malfunctioned.

- If the Glideslope pointers remain out of view during a front course ILS approach, either the aircraft Glideslope receiver or the ground station Glideslope transmitter is malfunctioning. Glideslope is usually not available during a back course approach. (The VOR and LOC course display will continue to function normally even if a usable Glideslope signal is not being received.)

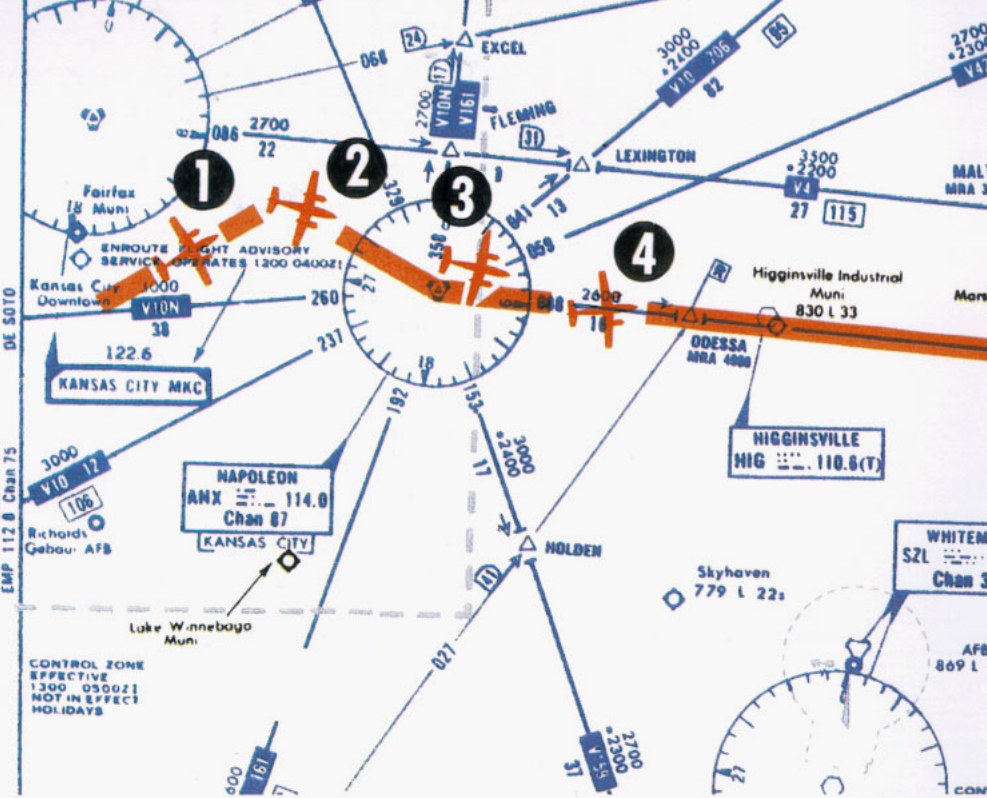
- A continuous large deflection of the slaving meter or large discrepancies between the magnetic compass and the KI 525A compass card may indicate a failure in the slaving system. If a slaving failure should occur, the Man/Auto switch should be moved to the Man position to select the free gyro mode. Then, by holding the CW/CCW switch to the appropriate side the compass card can be rotated to the correct heading as indicated on the standby compass. The KCS 55A system should continue to function normally except the heading information will be solely derived from the KG 102A Directional Gyro; there will be no automatic heading correction and periodic adjustments must be made manually to correct for precession by reference to the standby magnetic compass, as with any directional gyro.

NOTE: It is desirable to disconnect the autopilot under the following conditions:

1. HDG flag comes into view
2. System is in Fast Slave
3. During manual slaving

The system has the capability to supply the autopilot with an automatic disconnect signal under these conditions.

NOTE: For system limitations in your particular aircraft type, refer to your Flight Manual Supplement.



Procedures with the KCS 55A

The next few pages depict a normal flight departure from MKC enroute to STL via Victor Airway V-12. (The charts shown here are for illustration purposes only, not to be used for navigation.) Careful study of these photographs of the KI 525A PNI should give you a better idea of how simple and comprehensive the display really is.

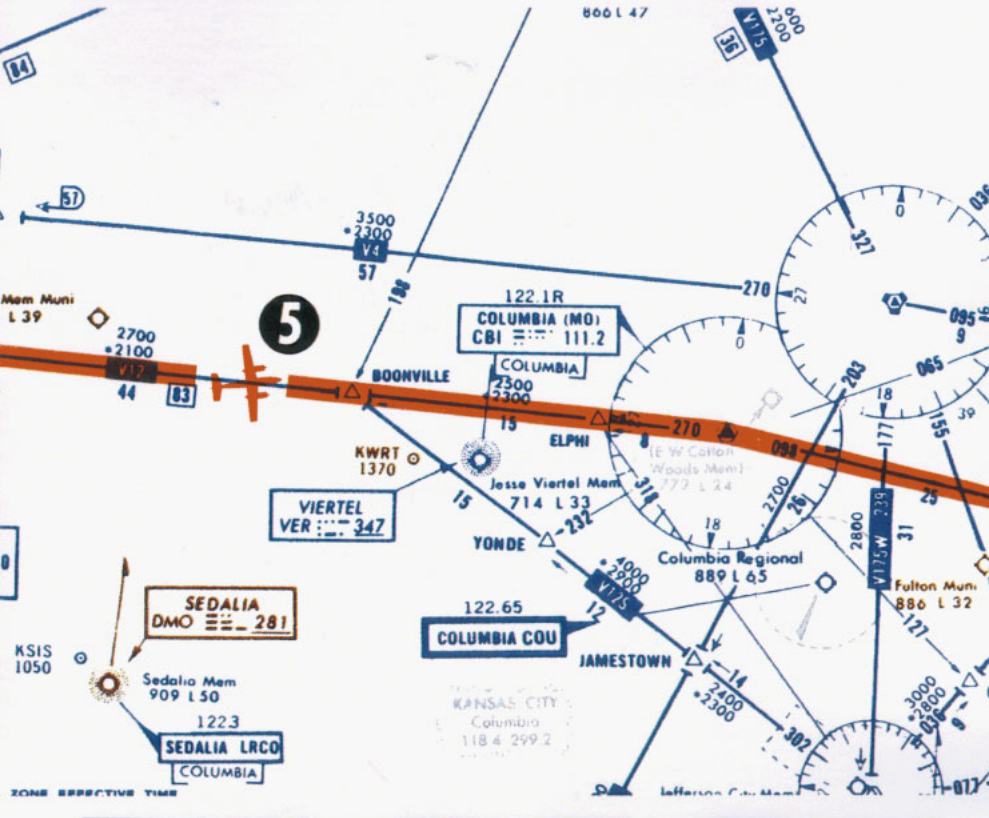
1.

Vectors to Intercept a Radial

After takeoff from Kansas City, we select a heading of 60° with the heading bug to intercept the 110° course to Napoleon (ANX) VOR. Selected course pointer is set on 110° with the course knob. The KI 525A Pictorial Navigation Indicator conveniently and accurately displays the intercept angle.

2.

The VOR deviation bar begins to center as we approach the 110° course to Napoleon. The KI 525A PNI makes it possible to intercept the new course smoothly, without overshooting or bracketing. One method of doing this is to adjust your heading so that the top of the deviation bar always touches the lubber line. As your aircraft heading approaches the new course, the deviation bar will swing towards the center and the angle of intercept will decrease.



3.

Turn to Intercept a Victor Airway

The "TO" indicator starts to swing to "FROM" as you fly over the Napoleon VORTAC station. At this time, set the selected course pointer on the V-12 course of 088°.

As you begin your left turn to track V-12, notice that the KI 525A PNI continuously displays an accurate picture of the relationship between your aircraft and the ANX 008° radial.

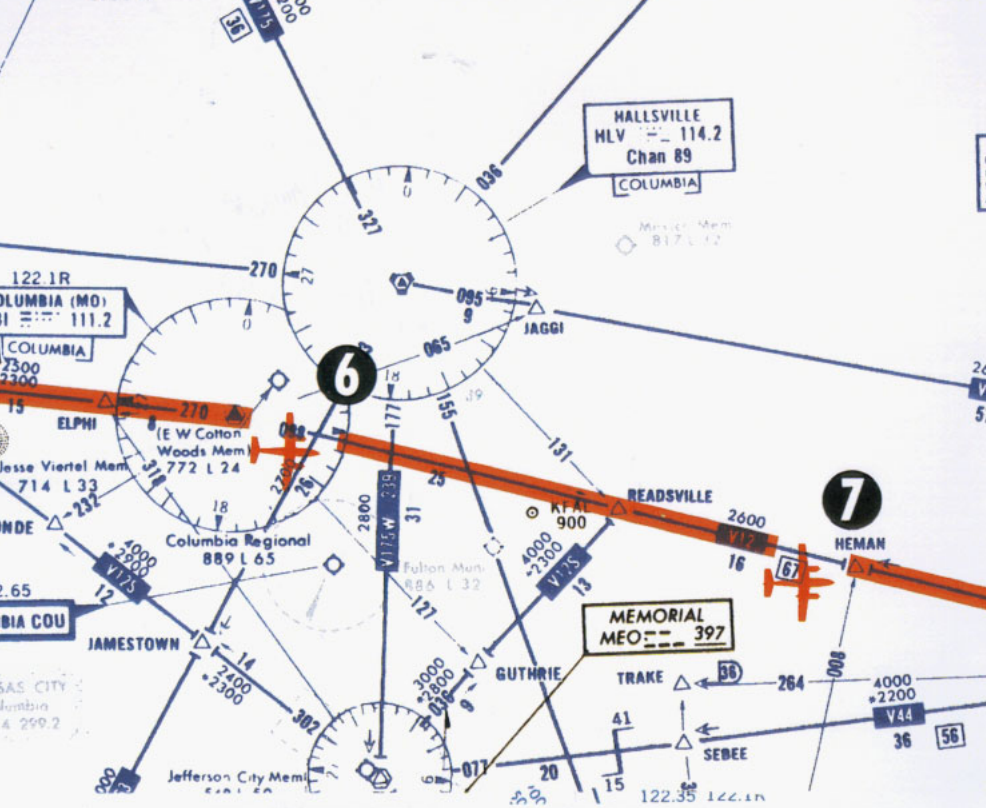
Once again, you can make a precise, coordinated course interception by adjusting your heading to keep the top of the deviation bar touching the lubber line.

4.

When the deviation bar is centered and aligned with the course arrow, you are on course. Notice that correction for wind drift—in this case, a 080° heading on a 088° course—is completely automatic as long as you keep the deviation bar centered.

5.

About midway between Napoleon and Columbia (CBI), you switch to the CBI VOR and the TO/FROM indicator immediately swings to "TO". Also note the course arrow should be moved from 088° to 090°, which is the V-12 inbound course to CBI.

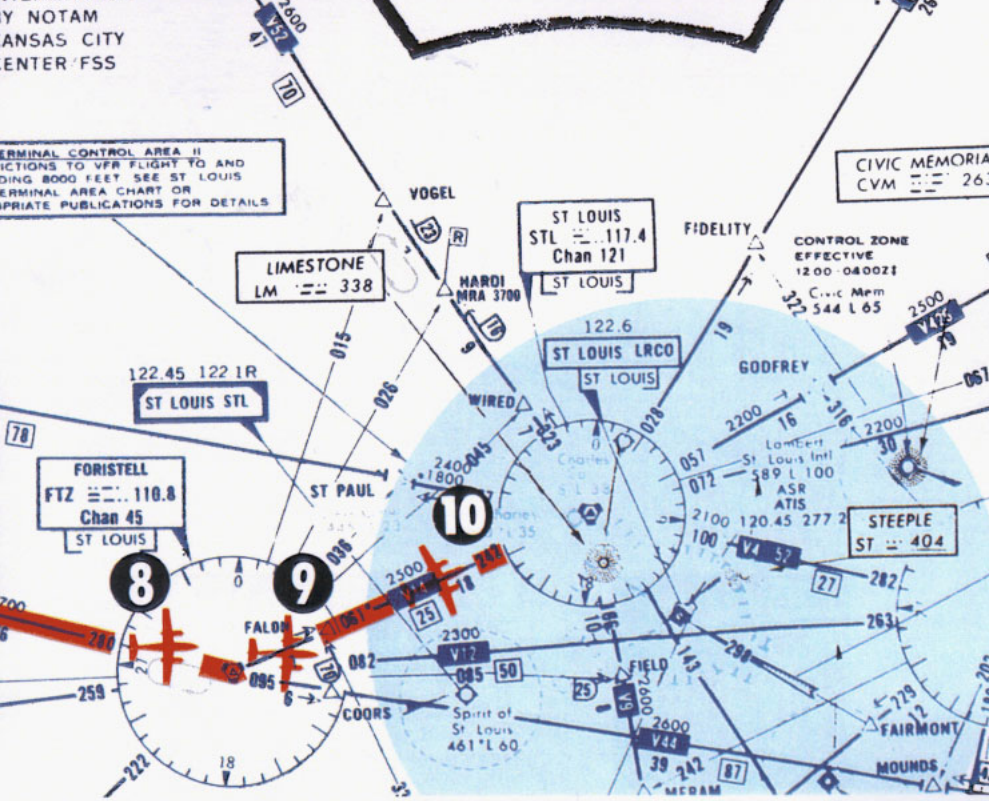


6.

As you fly over the Columbia station, the TO/FROM indicator changes to "FROM". Since the outbound course for V-12 from Columbia to Foristell (FTZ) is 098°, you now set the selected course pointer on 098° and fly to keep the deviation bar centered.

7.

Near the Heman intersection you switch to Foristell VORTAC and move the course arrow to 100°, which is the V-12 inbound course to FTZ. The TO/FROM indicator changes to "TO".



8.

Airway Interception

Your clearance is V-12 to Foristell, then V-14 to the St. Louis (STL) VORTAC, direct Lambert Field. Approaching the FTZ station, the heading bug is on 100° as a reference for the V-12 course or as heading command for the autopilot, if used. Select the St. Louis VORTAC on the NAV receiver and set the course pointer on the STL 061° course.

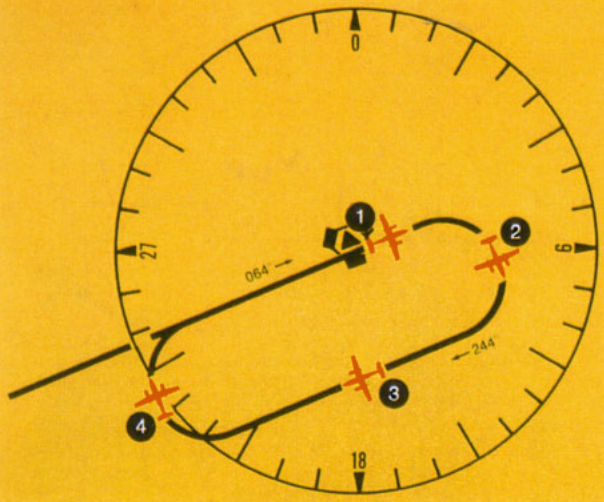
9.

As you cross the Foristell VORTAC, the deviation bar will align with the course arrow. Now set the heading bug to 061° and turn left to follow V-14 to the STL VORTAC.

10.

You are now established on V-14, flying to the STL VORTAC. Once again, if you fly to keep the deviation bar centered, correction for wind drift will automatically be accomplished.

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



Holding Pattern

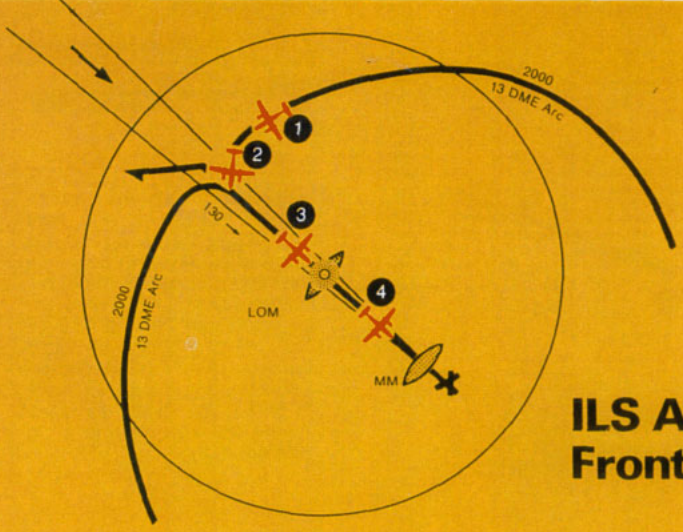
1. Approaching the STL VORTAC, the controller asks you to hold southwest of the VORTAC on the 244° radial, right turns. You are now over the station with a 064° course selected (the TO/FROM indicator has swung to "FROM"). Set your heading bug to the reciprocal or outbound heading of 244° for easy reference and begin your right turn holding pattern.

2. Halfway through the outbound turn, the KI 525A display shows the deviation bar behind the symbolic aircraft. You know, therefore, that you must eventually fly back to the radial in order to be on course during the inbound leg of the holding pattern.

3. Outbound, you are using the heading bug as a reference for 244°. The 244° radial is off the right wing and parallel to your outbound course.

4. Halfway through your turn to the inbound 064° course, the KI 525A shows the symbolic aircraft approaching the deviation bar at a right angle. By keeping the top of the deviation bar on the lubber line, you can complete your turn and roll out precisely on course.

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



ILS Approach—Front Course

1. You are vectored from the holding pattern to the 13-mile DME arc. The aircraft is turning, with the heading bug set on 170° to intercept the Localizer. You have already set the selected course pointer on the inbound ILS course 130° and the KI 525A shows the Localizer course is directly ahead. The Glideslope pointers came into view when the ILS frequency was tuned, since a usable Glideslope signal is being received.

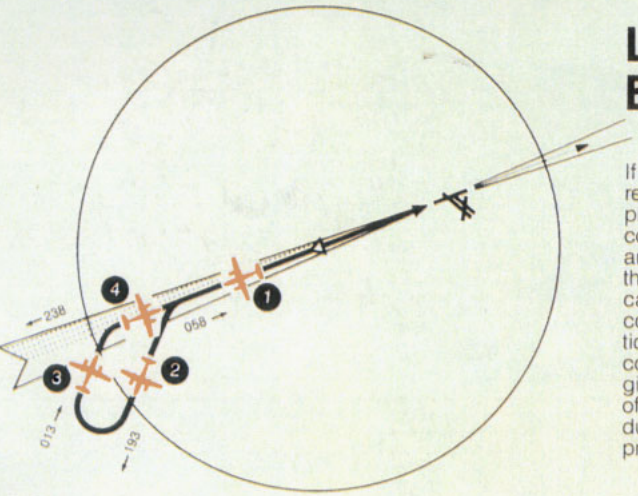
2. Capturing the ILS course can be accomplished without overshooting or bracketing with the same technique you used in intercepting an enroute course: Simply keep the top of the deviation bar on the lubber line and coordinate your turn until the bar is centered with the course arrow. Each dot on the LOC deviation scale represents 1/2° deviation when tuned to an ILS frequency.

3. The KI 525A shows you that you have intercepted the Localizer course. The Glideslope pointers have started to center, although the display indicates your aircraft is still below the glidepath at this point.

4. You are now centered on the Localizer and the Glideslope. Once again, the KI 525A shows your aircraft is crabbed about 005° to the right to maintain the Localizer course.

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

LOC Approach—Back Course



If a back course approach is required, it can be accomplished as easily as a front course approach. The course arrow should always be set on the front course inbound Localizer course. This will result in conventional pictorial deviation sensing even on back course. The KI 525A display gives you an accurate picture of where you are at all times during the approach and the procedure turn.

1. You are outbound on the back Localizer course, having already set the course pointer to the inbound front course at 238°. The heading bug is preset at 193° for the procedure turn. (Since there is usually no Glideslope signal on a back course, the Glideslope pointers are out of sight.)

2. During the procedure turn outbound, the deviation bar shows pictorially that the aircraft (as represented by the symbolic aircraft in the center of the KI 525A) is flying away from the Localizer centerline at a 45° angle when the heading marker is under the lubber line. Note that left-right deviations of the course bar give "fly-to" indicators, just as on the front course.

3. Now you've reset the heading marker to 013° and made a 180° turn to this heading. This 013° heading will intercept the back course. The KI 525A clearly pictures the course you are to intercept and the angle of interception.

4. You have smoothly intercepted the back course. Since the course arrow is set on the front course (238°), the KI 525A shows a true picture of the situation . . . flying inbound on the back course. You may reset the heading marker to 058° for easy reference.

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

THIS IS THE COMPLETE KCS 55A SYSTEM.

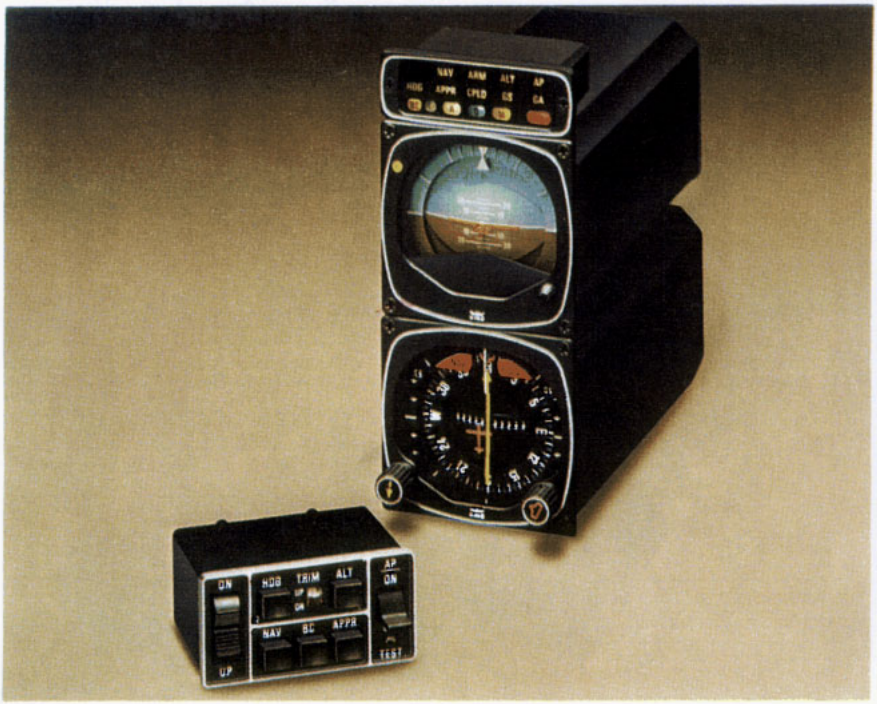
The KI 525A Pictorial Navigation Indicator is the panel display for the KCS 55A Compass System. It combines the functions of the standard directional gyro and the VOR/LOC/Glideslope deviation indicator.

The KG 102A Directional Gyro provides the gyro-reference for the system. Power may be from either 14 or 28 volts DC. Remote mounted.

The KMT 112 Magnetic Slaving Transmitter senses the direction of the earth's magnetic field and continuously transmits this information to correct for gyro drift. Remote mounted usually in a wingtip.

The KA 51B Slaving Control and Compensator Unit is panel-mounted. It provides selection of "slaved gyro" modes for the system and manual slaving when the system is in "free gyro" mode. The meter indicates proper slaving operation. 14 and 28 volt lighting options available.

INTRODUCTION TO THE KAP 200 AUTOPILOT SYSTEM



With this lower-cost KAP 200 control system option, King offers you basic Autopilot-only flight capability.

An air driven, panel-mounted KG 258 Vertical Gyro replaces the V-bar Flight Command Indicator in this system. There are no Flight Director "V-bar" computed commands or "Go-Around" modes.

A KC 292 Mode Controller replaces the KC 290 used in the KFC 200 System. The KC 292 has a servo trim indicator in place of the KC 290's Flight Director button.

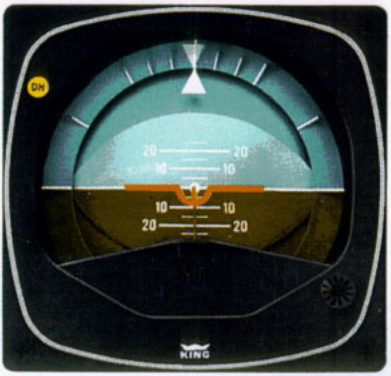
When there is no mode selected and the autopilot is engaged, the basic Autopilot mode is wings level and pitch attitude hold. All the modes described for the KFC 200, with the exception of GO-AROUND, are included in the KAP 200 system.

Thus, with the exceptions of the Flight Director and GO-AROUND mode, the affordable KING KAP 200 system retains the most desirable features of the KFC 200 system. These include Pictorial Navigation Indicator, complete mode annunciation and workload reducing operational modes.

KAP 200 System Panel Checklist:

The KA 285 Mode Annunciator Panel tells the pilot when his selected mode has been received and accepted by the Autopilot flight computer, and, if an "armed" mode has been selected, it notifies the pilot when capture has been initiated. Integral marker beacon lights and trim failure warning are also included.

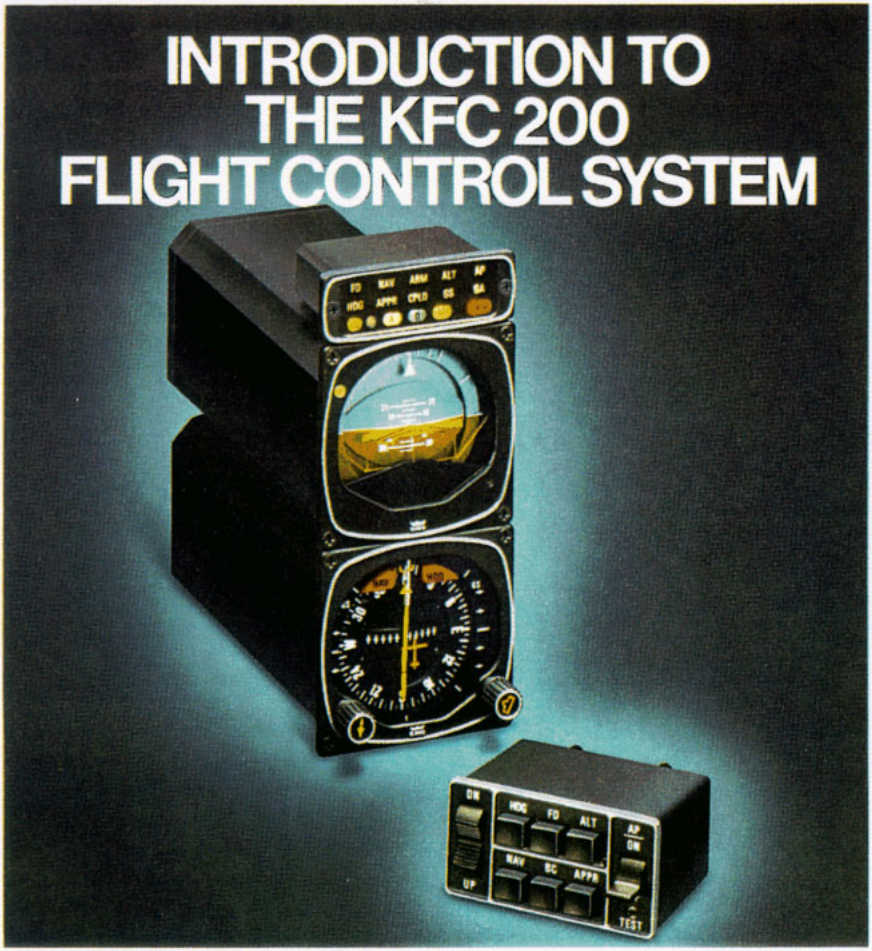
The KG 258 Vertical Gyro is a standard air-driven attitude reference indicator styled to match Silver Crown avionics. The KG 258 features a prominently-placed DH (Decision Height) annunciator light for use with the aircraft's radar altimeter.



The KI 525A Pictorial Navigation Indicator was described on pages 5 and 6.

The KC 292 Mode Controller is used to turn on the Autopilot system and to select all operating modes. A solenoid-held switch engages the Autopilot, and five pushbutton switches are used to select the desired modes. A vertical trim rocker switch, servo trim indicator, and preflight test button are also contained in this unit.

INTRODUCTION TO THE KFC 200 FLIGHT CONTROL SYSTEM



The TSO'd King KFC 200 Flight Director/Autopilot is a complete 2-axis (pitch and roll with altitude hold) integrated system with professional 3-inch Flight Director displays. An optional 3-axis configuration with yaw damper mode is available for some aircraft at slightly higher cost.

The basic 2-axis system provides all standard operating modes and functions, plus important pilot-oriented features usually found only in larger, more expensive equipment.

The "brain" behind this whole system is the solid-state KC 295 Flight Computer. It provides computed pitch and roll commands which are displayed as visual guidance commands on the V-bar of the KI 256 Flight Command Indicator.

Electric trim is also provided, along with an automatic autopilot trim system.

KFC 200 System Panel Checklist:

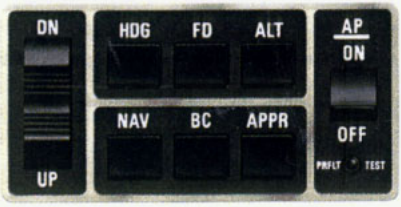
The KA 285 Annunciator Panel annunciates all vertical and lateral Flight Director/Autopilot system modes, including all "armed" modes prior to capture. It tells the pilot when his selected mode has been received and accepted by the system and if an "armed" mode is selected when capture has been initiated. It also has integral marker beacon lights and trim failure warning.

The KI 256 Flight Command Indicator (FCI) displays the following information:

- Pitch and roll attitude
- Pitch and roll commands
- DH (Decision Height) annunciation when used with radar altimeter

The KI 256 FCI contains an air driven vertical gyro. Engine(s) must be running, pressure system operating and gyro up to speed before system will operate.

The KI 525A Pictorial Navigation Indicator displays constantly slaved gyro magnetic heading information, along with VOR/LOC/RNAV course deviation and Glideslope deviation indications. (See pages 5 and 6.)



The KC 290 Mode Controller contains six pushbutton switches for turning on the Flight Director and selection of all FD modes; a solenoid-held switch for Autopilot engagement; a vertical trim rocker switch and a preflight test button.

The KC 291 Yaw Mode Controller is installed adjacent and to the right of the KC 290 Mode Controller when the optional yaw (rudder) axis is included in the KFC 200 system. The yaw axis is wired so that it automatically engages when the Autopilot is engaged. Disengagement of the yaw damper is accomplished by pushing the button on the KC 291 or the A/P disconnect on the control wheel.

KFC 200 Control System Components

KA 285
Mode Annunciator

VOR/LOC/RNAV Deviation

Middle Marker

Glideslope Deviation

Pitch Attitude/
Roll Attitude

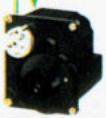
Pitch Command/
Roll Command

KC 295 Flight Computer
Contains:
Logic & Analog Summing
Altitude Sensor
Trim/Pitch/Roll
Servo Amplifiers
Power Supply

KI 256 Flight
Command Indicator

Heading Select or
Course Datum

KI 525A Pictorial
Navigation Indicator



Pitch Trim
Servo/Mount
KS 272/A/KM 276

KC 290
Mode Controller

KG 102A
Slaved DG

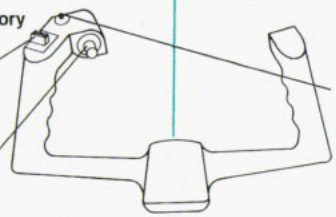
KMT 112
Flux
Detector

Pitch
Servo/Mount
KS 270/A/KM 275

KA 51B
Slaving
Accessory

Static
Pressure

Roll
Servo/Mount
KS 271/A/KM 275



Manual
Electric Trim

Control
Wheel Steering

Go-Around
on Throttle

Autopilot
Disconnect/
Trim Interrupt

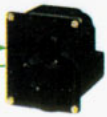
(this is a 2-axis system)

3rd axis system

KC 291
Yaw
Controller

KRG 331
Rate Gyro
Mount

KC 296
Yaw
Computer



Yaw Servo/Mount
KS 271/A/KM 275

KFC 200 System Integration

The adjacent system diagram shows the components of the KFC 200 integrated Flight Control System and their relationships.

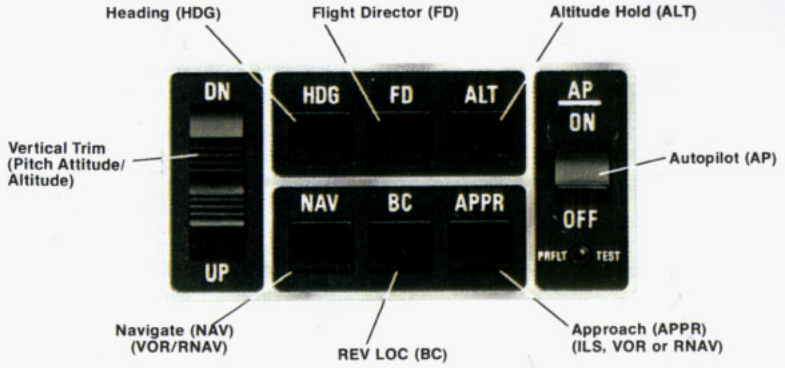
The system has a number of inputs and outputs: Sensor output shown in red; Computation input shown in blue; Display outputs shown in orange; Aircraft control shown in green. All sensor information (pitch and roll reference; Heading error or course datum; RNAV/VOR/LOC/GS deviation and flags; Marker receiver and static pressure (altitude) is fed into the KC 295 Flight Computer.

The Flight Computer computes roll and pitch steering commands. These two commands are routed to the KI 256 Flight Command Indicator, where they are displayed on the V-bar as visual guidance commands. These steering commands are also fed to the Autopilot computation circuits contained in the Flight Computer and generate the aileron, elevator and elevator trim commands for the Autopilot. An optional yaw channel is available, but it is independent of pitch and roll commands.

Using the same pitch and roll commands 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.

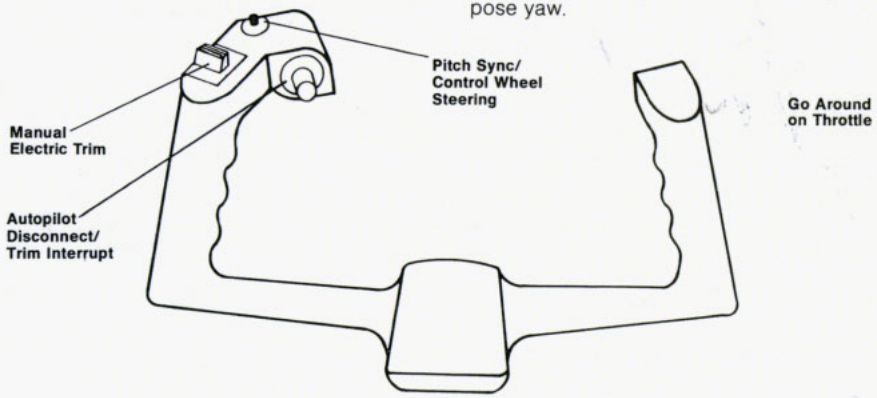
Full integration of Flight Director and Autopilot allows the pilot to delegate the manual effort of flying the aircraft to the Autopilot while monitoring its activity with the Flight Director.

Modes of Operation Flight Director System



Flight Director Mode	Flight Director Guidance and Command to Autopilot
Attitude Reference	Power on and no modes selected. FCI displays aircraft attitude and PNI displays aircraft heading. Command V-bar is biased out of view. Aircraft engine must be running for pressure to be applied to FCI attitude gyro.
Flight Director (FD)	Command V-bar will appear and command wings level and pitch attitude of the aircraft at the time of mode selection.

Heading (HDG)	Select desired heading on PNI, then select HDG mode and the system will command the necessary bank to turn to and maintain the selected heading.
Navigato (NAV) (VOR/RNAV)	Bank command to capture and track a selected VOR or RNAV course.
Approach (APPR) (ILS, VOR or RNAV)	Bank and pitch commands to capture and track LOC and Glideslope for precision approaches...bank command to capture and track VOR and RNAV courses for non-precision approaches.
Reverse Localizer (BC)	Bank command to capture and track a reverse LOC course...Glideslope is locked out.
ARM	Standby mode to compute automatic capture point for NAV, APPR or BC.
CPLD	Active mode for NAV, APPR or BC.
Go Around (GA)	Wings level and pitch up command to proper missed approach climb attitude.
Altitude Hold (ALT)	Pitch command to maintain engaged altitude.
Vertical Trim	Pitch command to adjust altitude at 500 fpm while in Alt. Hold; or pitch attitude at a rate of 1 deg/sec when not in Alt. Hold.
Autopilot (AP) Engage	Aircraft control surfaces (ailerons and elevators) smoothly respond to all selected Flight Director mode commands with automatic pitch trim. Engages Yaw Damper if present.
Pitch Synchronize/ Control Wheel Steering	Manual Flight maneuvering without the need to disengage and reengage the Autopilot/Flight Director and Autopilot; Synchronizes the pitch axis.
Yaw Damper (YD) Engage (optional system)	System senses motion around yaw axis, and automatically moves rudder to oppose yaw.



Typical Control Wheel Switch Arrangements

Operating the KFC 200 System

There are eleven (11) modes of operation that are provided by the KFC 200 system to offer the pilot Flight Director/Autopilot commands in response to his selection of desired modes on the Mode Controller.

Most of these modes are activated by pushbutton switches on the Mode Controller. These pushbuttons operate with alternate action. The first depression of the pushbutton activates a mode; the second depression cancels it, if it has not already been automatically deactivated. Annunciation of the mode selected appears on the annunciator panel.

Any operating mode not compatible with a newly-selected mode will be automatically cancelled in favor of the pilot's latest selection. This lets the pilot advance along his flight sequence without the inconvenience of having to manually cancel modes. For example, if in NAV CPLD mode, selection of Heading will automatically cancel NAV.

The Basic Mode of System Operation

The system will be in the Basic Attitude Reference or "Gyro" mode with engine running and aircraft "power on," but no modes selected (Annunciator Panel blank). This provides indication of aircraft heading on the Pictorial Navigation Indicator, and roll and pitch attitude on the Flight Command indicator. The FCI Command V-bar is biased out of view.

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

System Safety is Assured by Integrity Monitors.

The KFC 200 monitors the validity of the system sensors and the Flight Computer to alert the pilot when sensor information is faulty and when the system cannot respond correctly to command signals.

"Invalid" signals provide visual warning by means of the flags and annunciators. "Invalid" NAV signals are also routed to the KFC 200 switching logic to "lock out" modes which will not operate reliably.

Most failures in the slaved compass system would be annunciated by a HDG flag and the system would not allow selection of the Heading mode.

The illustrations above show the KFC 200 Flight Director cockpit displays with all warning flags in view.

Flight Command Indicator warnings: Flight Director (FD) Command V-bar will bias out of view whenever the FD mode is not selected; when FD internal power is inadequate and when gyro excitation information is invalid.

The Pictorial Navigation Indicator warnings: A HDG flag indicates that the compass information is not reliable. A NAV flag indicates that a valid NAV Signal is not being received.

When an ILS channel is selected on the NAV receiver and a valid Glideslope signal is received, the Glideslope pointers will drop into view. Glideslope coupling usually occurs at Outer Marker, when the Glideslope is intercepted and APPR CPLD. If, after GS coupling, the GS pointers disappear, the system will flash the GS Annunciator and revert from GS back to Pitch Attitude Hold. If the GS pointers return into view the system will revert back to GS coupled. The NAV warning flag indicates an invalid Localizer but has no effect on Glideslope operation.

The Trim warning light in the lower right corner of the Annunciator Panel will light when an Autotrim failure occurs or when the trim breaker is pulled. It will also flash at least four times when the TEST switch on the Mode Controller is depressed.

Preflight Test Determines, Before Takeoff, that the System is Operating Normally.

With power on, all circuit breakers in, and engine running, allow 3 minutes for the gyros to come up to speed.

Check the slaving switch position on the KA 51B Slaving Meter, making sure you are in slaved gyro mode, and compare the compass card on the KI 525A with your magnetic compass. (See your KCS 55A Pilot Guide for more detailed information.)

With no modes engaged, depress the Preflight Test button on the Mode Controller. All modes will be annunciated on the Annunciator Panel, including Marker lights, and the red Autotrim light will flash. At least four flashes are needed to indicate proper Autotrim monitor operation.

The pilot first engages the Flight Director, either by depressing the FD button or Pitch Sync (CWS) button. This will synchronize the Command Bars with the existing aircraft pitch and command wings level. Next, engage the Autopilot and apply force to the controls to determine if the Autopilot can be overpowered.

NOTE: The Autopilot will not engage when the Flight Director is not operating.

To confirm proper operation of all servos (except Yaw Damper), synchronize the Flight Director for wings level. Command nose up with FD Vertical Trim control. After 3 seconds you should observe the elevator trim wheel turning in the direction commanded.

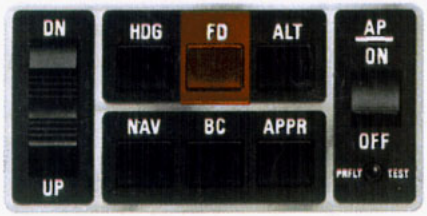
Re-synchronize the FD for wings level by using the CWS button, then command nose down with FD Vertical Trim control. After 3 seconds you should again observe the elevator trim wheel turning in the direction commanded. Re-sync the FD.

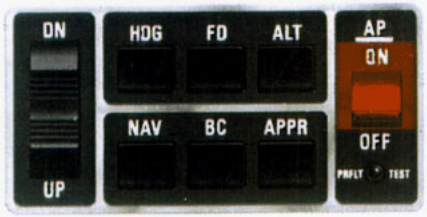
Now set the heading bug under the lubber line on your PNI and engage HDG SEL mode. Move the heading bug to the right and to the left and observe if the controls operate as commanded.

Disengage the AP and check aircraft manual pitch trim. Set trim to takeoff position. This concludes the preflight test.

IMPORTANT: This Pilot Guide provides a general description of the various operational characteristics of the KFC 200 Flight Control System. However, operation of the system should not be attempted without first reviewing your FAA Approved Aircraft Flight Manual Supplement for complete system familiarization.

Pertinent limitations, procedures and warning statements from your aircraft Flight Manual Supplement are contained in this Pilot's Guide.





CAUTION: Overpowering the Autopilot in the pitch axis in flight for periods of 3 seconds or more will result in the autotrim system operating in the direction to oppose the pilot and will, therefore, cause an increase in the pitch overpower forces, and if Autopilot is disengaged, will result in a pitch transient control force. Operation of the Autopilot on the ground may cause the autotrim to run because of backforce generated by elevator downsprings or pilot induced forces.

FLIGHT DIRECTOR Mode (FD)

The Flight Director mode is activated by depressing the "FD" button on the Mode Controller.

The FCI Command V-bar will appear and provide the pilot with steering commands to maintain wings level and the pitch attitude that existed at the time of Flight Director engagement. To fly the Command V-bar, the pilot will bank and pitch the aircraft to put the orange delta wing "aircraft" into the V-bar. The command is satisfied when the V-bar aligns symmetrically at the top of the orange delta wing.

If pitch attitude is changed, recycling the FD button will synchronize the Command V-bar to the new pitch attitude.

If a change only in the commanded pitch attitude is desired, the Control Wheel Steering (CWS) button installed on the pilot's control wheel allows the pilot to synchronize the Command V-bar (in the FD mode with Autopilot disengaged) without removing his hand from the control wheel.

The Flight Director can also be activated by direct selection of any specific mode, which will activate the Command V-bar. Such selection will illuminate both FD and the appropriate annunciator mode.

Special note: The FD mode must be activated before the Autopilot can be engaged.

The Vertical Trim switch may be used to adjust the selected pitch attitude up or down at 1 deg/second.

AUTOPILOT ENGAGEMENT (AP)

The Autopilot is engaged by moving the solenoid-held AP switch on the Mode Controller to the "ON" position.

CAUTION: Prior to Autopilot engagement, the pilot should make sure the V-bar commands are satisfied. This will prevent any rapid changes in the aircraft's flight path when the Autopilot is engaged.

The Autopilot provides two-axis (pitch and roll) stabilization and automatic elevator trim as well as automatic response to all selected Flight Director commands.

Installation of optional 3rd axis (rudder command) will damp out yaw oscillations and provide automatic turn coordination.

Upon Autopilot disconnect, an Aural Alerter will sound a Sonalert for 2 to 2½ seconds while the AP light on the Annunciator Panel flashes.

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

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 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, unusually slow gyro erection (leveling) will occur. 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.

HEADING SELECT/PRESELECT Mode (HDG)

Select a desired heading by positioning the heading "bug" on the PNI. This is done with the HDG knob on the PNI.

Depress the HDG button on the Mode Controller to activate the HDG mode. "HDG" will light on the Annunciator Panel and a computed, visually displayed bank command is shown on the FCI. Following this bank command, the aircraft will bank and roll out on the desired preselected heading.

The Command V-bar on the FCI will deflect in the direction of the shortest turn to satisfy the commanded turn of the preselected heading. The aircraft may be manually banked to realign the V-bar and satisfy the command or, if the Autopilot is engaged, the aircraft will automatically bank, turn to, rollout and hold the preselected heading. As the aircraft approaches the selected heading the V-bar will command a rollout to wings level.

With the HDG mode in operation, subsequent changes made in the heading "bug" position on the PNI will immediately cause the V-bar on the FCI to call for a turn to the new heading, unless the HDG button on the Mode Controller has been depressed again to cancel the HDG mode.

The HDG mode is cancelled when NAV or APPR coupling occurs, or when FD mode button is pushed to "OFF".

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

NAVIGATION (NAV ARM and NAV CPLD) Mode

The NAV mode provides visual bank commands on the Flight Command Indicator and deviation guidance on the PNI to intercept and track a VOR course or an RNAV course.

Operation of the NAV mode requires the pilot to:

1. Tune to the frequency of the selected VOR (or VORTAC) station. For RNAV operation, set in waypoint distance and bearing from the VORTAC station.
2. Set the PNI course pointer on the desired course.
3. Establish angle of intercept by setting heading "bug" and activate "HDG" mode.
4. Depress the NAV button on the Mode Controller.

When the "NAV" button on the Mode Controller is depressed, "NAV/ARM" will be lighted on the Annunciator Panel and the automatic capture circuit is armed. Heading select, if operatng, is retained until capture occurs.

The VOR or RNAV "course-capture" point is variable to prevent overshoot and depends on angle of intercept and the rate the course deviation is changing. Upon capture, a bank command will be displayed on the FCI; the HDG, if on, will be cancelled and "NAV/CPLD" will be lighted on the Annunciator Panel.

The pilot can manually bank the aircraft to satisfy the command display which will call for a rollout to wings level when on course centerline to track the course. Crosswind compensation is provided in the "track" state.

If the NAV mode is selected with the aircraft level within ± 4° of bank and within three dots of course deviation, NAV/ARM will be bypassed and NAV/CPLD will engage directly.

If the Autopilot is engaged, the aircraft will bank to satisfy the command display and rollout on course automatically.

Upon station (or waypoint) passage, an outbound course other than the inbound reciprocal can be selected by resetting the NAV course arrow on the PNI. This will cause an immediate V-bar deflection on the FCI directing a turn to the new course.

The NAV mode is cancelled by depressing the NAV button, or selecting HDG (when in NAV coupled) or APPR modes, or pushing FD to "OFF". Going back to HDG while adjusting OBS is desirable.

NOTE: Operation of the Marker Test function of the marker beacon receiver after APPROACH CPLD will reduce the Flight Control system gains. If this should occur, the APPROACH mode should be recycled.

APPROACH (APPR/ARM and APPR/CPLD, GS/CPLD) Mode

The APPR mode provides visual roll and pitch commands on the FCI V-bar to capture and track precision ILS (LOC and Glideslope) beams, or non-precision VOR or RNAV radials. Lateral and vertical deviation can be monitored on the PNI.

Operation of the APPR mode requires the pilot to:

1. Set the NAV receiver frequency.
2. Set the PNI course pointer to the inbound runway heading or the front course in case of ILS precision approach. Do this even on back course approach.
3. Set the HDG SEL "bug" on the PNI to the desired intercept angle and activate "HDG" mode.
4. Depress the "APPR" button on the *mode controller.*

The automatic APPR capture function will be immediately armed. "APPR/ARM" will be lighted on the Mode Annunciator Panel.

In APPR/ARM mode, prior to capture, HDG is retained to allow the pilot to adjust heading to Approach Control vectoring instructions.

The LOC beam or VOR/RNAV "capture" point will vary, depending on angle of intercept and rate of change of deviation indication. Upon capture, a bank command will be introduced on the FCI, the existing heading mode will be cancelled and "APPR/CPLD" will be lighted on the Annunciator Panel.

The pilot may manually bank the aircraft to satisfy the command display, which will command a rollout to wings level when the aircraft is on course. Automatic crosswind compensation will provide precise tracking. VOR/LOC deviation is shown on the PNI, and actual crab angle will be shown by offset of the course arrow from the lubber line.

Throughout APPR mode operation LOC and Glideslope deviation or VOR/RNAV deviation are displayed on the PNI.

If the Autopilot is engaged during operation in the APPR mode, automatic steering response will follow the command display on the FCI.

The Glideslope mode is armed for automatic capture if LOC front course capture has occurred. Automatic Glideslope capture occurs as the aircraft approaches the glide path from above or below.

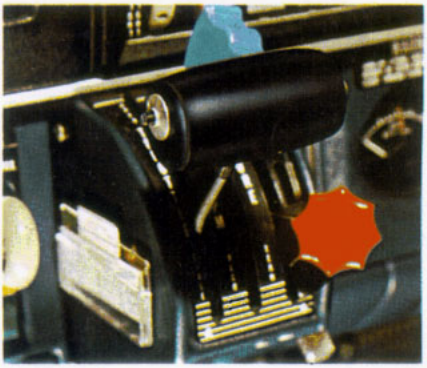
Upon interception of the Glideslope, capture occurs and "GS" is lighted on the Annunciator Panel. A smooth capture pitch command is displayed by the Command V-bar. The pilot (or Autopilot) controls the aircraft to satisfy the Command V-bar. Slewing ALT at time of GS centering will inhibit GS capture.

Upon GS capture, the ALT HOLD mode (if active) is cancelled. However, ALT HOLD may be manually reselected to maintain altitude upon reaching MDA if visual contact is not established.

During VOR or RNAV approches, Glideslope capture will not occur because the NAV receiver is channeled to a VOR station, not an ILS, and this locks out the Glideslope function.

APPR/CPLD mode is cancelled by selection of HDG, NAV, or Go-Around modes. . . or pushing FD or APPR to "OFF."

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



BACK COURSE (BC) Mode

Whenever a LOC or ILS frequency is selected, the BC mode may be activated by depressing the BC button on the Mode Controller, after selecting APPR. When in BC mode and Localizer capture occurs, the system will turn and track outbound on the front course or inbound on the back course. "BC" is lighted on the Annunciator Panel.

Operation on BC is identical to front course operation, except that automatic Glideslope capture is "locked out" by the switching circuitry. Localizer deviation on PNI will have the proper sensing if the front inbound Localizer course was set on the PNI.

GO-AROUND Mode

The Go-Around mode is primarily designed to assist the pilot in establishing the proper pitch attitude under missed-approach conditions. The Go-Around switch is located on the throttle lever for pilot convenience when applying climb-out power.

Depression of the Go-Around switch during an approach cancels the existing Flight Director modes and engages the Go-Around (GA) mode while also disengaging the Autopilot, if it is engaged*. A wings-level and pitch-up command is displayed by the FCI and "GA" is lighted on the Annunciator Panel. The magnitude of the pitch-up command is set to match Flight Manual criteria for each aircraft model.

Go-Around may be cancelled by use of Vertical Trim, Altitude Hold mode, Control Wheel Steering mode or by turning off the Flight Director.

**Some airplanes are certified with the Autopilot remaining engaged when GA is selected.*

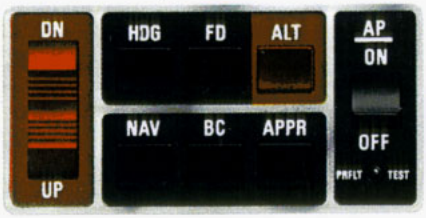
OPTIONAL ALTITUDE SELECT (ALT ARM) Mode

This mode allows the pilot to select an altitude and, upon approaching that selected altitude, obtain an automatic visual pitch command on the FCI to capture and hold the preselected altitude. To operate in this mode the pilot must:

1. Set the desired altitude into the "selected altitude" window of the KAS 297 Altitude Selector.
2. Establish a climb or descent as appropriate.
3. Depress the ARM button on the Altitude Selector. This may be done at any time during the climb or descent before the selected altitude has been attained. "ARM" will light on the Altitude Selector.
4. The Altitude "ALERT" annunciator in the KAS 297 will illuminate 1,000 ft. prior to reaching selected altitude and will cancel at 300 ft. prior. An aural tone will sound upon reaching altitude.

As the aircraft approaches the selected altitude, an "adaptive" pitch rate command will automatically guide the pilot through it at a low rate. As the aircraft reaches the selected altitude, ALT HOLD will automatically engage, "ALT " will light on the Annunciator Panel and "ARM" will disappear on the KAS 297. The command bars on the FCI will call for level flight at the selected altitude. If autopilot is engaged, the system will perform the required maneuvers.

ALT ARM is disengaged by depressing the ALT ARM button, by engaging ALT HOLD, by GS capture, or selecting FLT DIR to OFF.



ALTITUDE HOLD (ALT HOLD) Mode

This mode will cause a computed visual pitch command on the FCI command bars to hold the aircraft at the pressure altitude existing at the time it was activated.

The mode is activated either automatically by the ALT ARM function, or manually by depressing the ALT button on the Mode Controller.

If the autopilot is engaged, it will automatically hold the aircraft at that altitude.

The Vertical Trim switch may be used to adjust the selected altitude up or down at a constant rate of 600 fpm without disengaging the mode. This enables the pilot to conveniently adjust the aircraft altitude to match resetting of the altimeter, or to make short descent segments during a nonprecision approach.

The ALT HOLD mode is cancelled by automatic Glideslope capture or selection of ALT ARM, or GO-AROUND modes, or selection of FLT DIR to OFF.

MANUAL ELECTRIC TRIM

Manual Electric Trim switch on the yoke automatically disengages the AP (roll and pitch, but not yaw) in all installations, but will not affect the FD.

Use of the AP DISC/TRIM INTERRUPT switch on the control wheel will disengage the AP, Yaw Damper and, in some installations, the Flight Director.

It is important that you consult the Flight Manual Supplement for your particular aircraft for detailed instructions.

CONTROL WHEEL STEERING (CWS) Mode

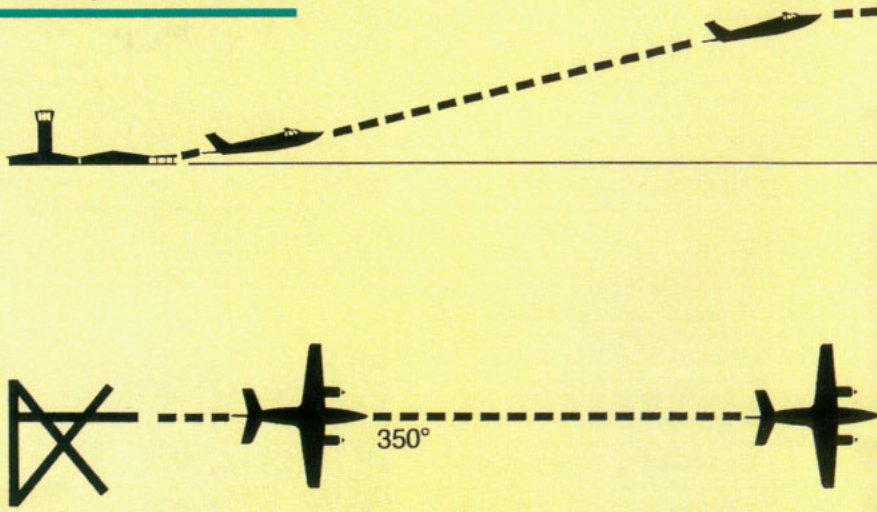
When the Autopilot is engaged, Control Wheel Steering provides the pilot with the capability for natural and convenient manual maneuvering of the aircraft without the need to disengage and reengage the Autopilot, or reselect any modes of operation.

The CWS mode is engaged by continuous pressure on the CWS button, normally located on the left-hand horn of the control wheel. Operation of the CWS button causes immediate release of Autopilot servos and allows the pilot to assume manual control, while Autopilot control functions and Pitch Command and Altitude Hold modes are synchronized so that, upon release of the CWS mode button, the Autopilot will smoothly reassume control of the aircraft to the original lateral command and existing vertical command.

Since all engaged modes remain coupled (in synchronization) during operation of the CWS mode, their annunciator lights will continue to show on the Annunciator Panel. The CWS mode is not separately annunciated.

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

Takeoff and Climb to Assigned Altitude

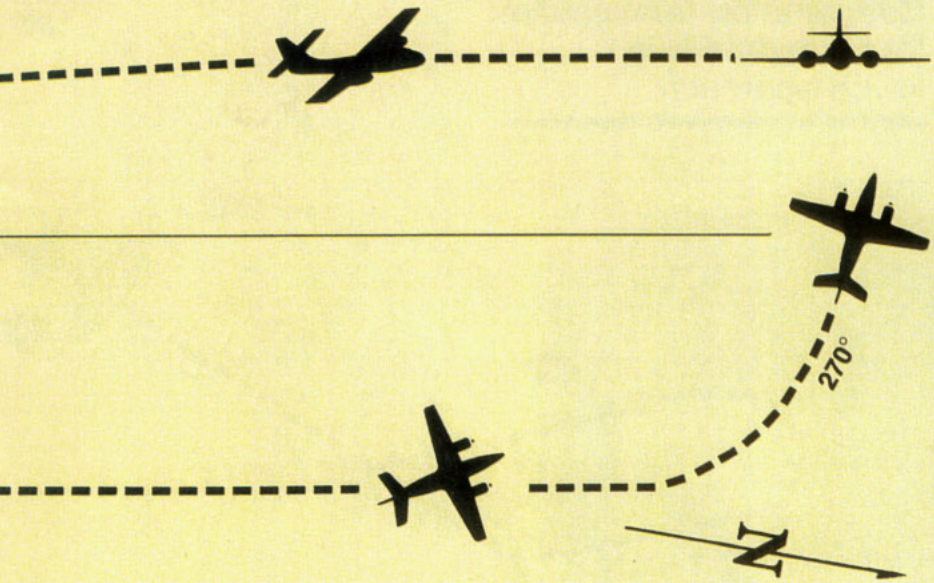


1. The FD has been engaged. Takeoff is in the GO-AROUND mode, activated by depressing the GO-AROUND button located on the throttle. "GO-AROUND" is lighted on the annunciator panel. Wings are commanded level and the nose up to the GO-AROUND angle. Takeoff is on runway 35 as shown on the PNI.

2. The aircraft is well off the ground and climbing.

The heading "bug" on the PNI is turned to a desired heading and HDG mode has been pushed on.

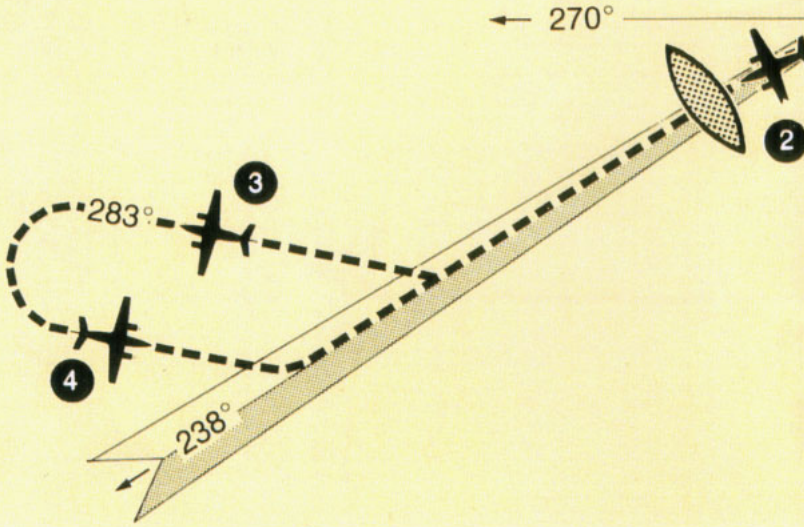
The Flight Director has responded with the Command V-bar calling for a left turn to the 270° heading and takeoff pitch attitude. The aircraft has not yet responded to the heading command but will as soon as the Autopilot is engaged.



3. With the Autopilot engaged, the aircraft is responding to the FCI commands with a left bank. Takeoff climb attitude continues. (Desired altitude may now be selected and armed on the optional KAS 297 altitude selector. Altitude alerting will be provided as you approach your selected altitude.)

4. Desired altitude has been reached, ALT HOLD mode has been engaged and the aircraft has returned to level flight. The 270° heading has been acquired.

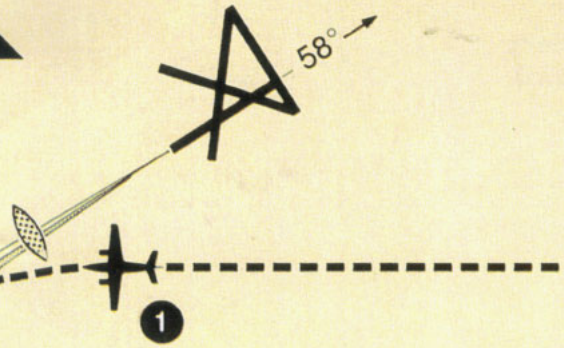
Outbound on front course for procedure turn to ILS approach.



1. In HDG SEL and ALT Hold mode on a LOC channel, the aircraft is heading 270° toward the Localizer. The front inbound localizer course of 58° is selected. APPR mode and "BC" have been selected. 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 the APPR CPLD mode is automatically activated and a left turn outbound on the localizer is commanded by the FCI, and is satisfied by the Autopilot.

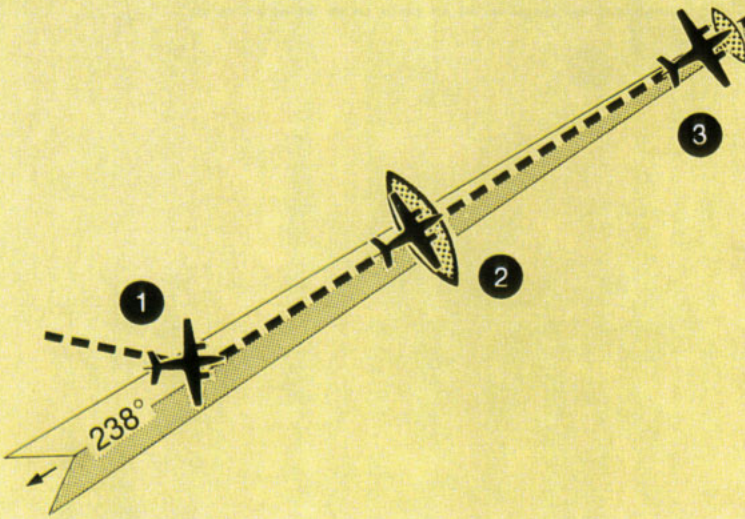
Note that the left-right deviations of the bar give "fly-to" indications just as on the front course inbound.



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

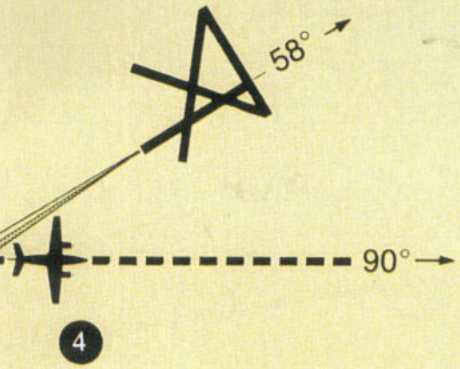
4. Now you have reset the heading select bug to 103° and made a 180° turn to this heading. This 103° heading will intercept the front course. You must now reselect Approach mode by depressing the APPR button on the Mode Controller. The PNI clearly pictures the course you are to intercept and the angle of interception. APPR ARM mode has been selected so that automatic capture of the Localizer will occur.

Front course ILS approach with missed approach and Go-Around.



1. Continuing the maneuver on preceding page, APPR coupling occurs and the Glideslope mode is automatically armed. The Command V-bar will command a turn to the LOC course and the PNI shows your position in relation to the LOC course.

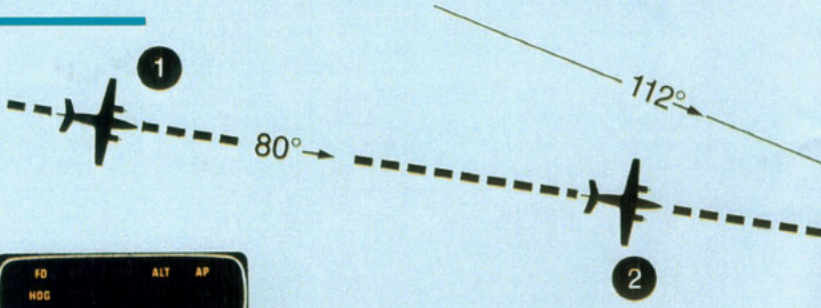
2. The Autopilot (or pilot) is following the Command V-bar on the FCI which command the necessary heading to maintain on centerline of the Localizer. At the Outer Marker the Glideslope pointers are approximately at midpoint. Altitude Hold is automatically disengaged and Glideslope capture occurs when the airplance passes thru beam center. The V-bar will command a descent on the Glideslope and on Localizer.



3. At the Middle Marker a missed approach is executed by pressing the Go-Around button on the throttle as you increase power. This disengages the Autopilot and the FCI commands the correct nose-up attitude and wings level. At the discretion of the pilot, the Autopilot may be reengaged to complete the missed approach. (Some airplanes are certified with autopilot remaining engaged when GA selected.)

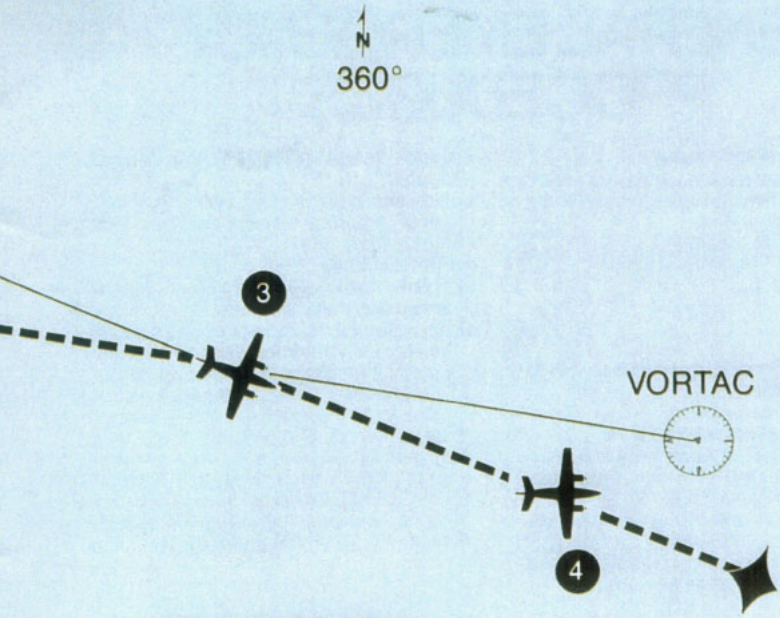
4. The heading "bug" has been previously set to the missed approach heading, 90°. Activating the HDG mode will cause the Command V-bar in the FCI to command a turn to that heading. Pitch-up attitude may be adjusted from the Go-Around angle by using CWS or the Vertical Trim control on the Autopilot controller, either of which terminates "GA" mode.

RNAV Capture:



1. The aircraft is flying an OMNI airway in HDG mode on a heading of 80°.

2. A waypoint has been established and the RNAV computer is in ENROUTE mode. A 112° course to the waypoint has been selected and NAV mode pushed "on". HDG and NAV/ARM modes are activated for automatic capture of the 112° course to the waypoint. The capture rate is now being computed based on closure rate. The airplane must be headed toward the selected course in order for NAV/CPLD to occur.



3. Capture sequence starts when NAV/CPLD mode is automatically engaged, cancelling the NAV/ARM and HDG modes. The Command V-bar will call for a right bank which is being satisfied by the Autopilot.

4. The aircraft has completed its turn to the 112° course. A wind correction produces an aircraft heading of 105°, displaying a 7° "crab" angle to maintain the 112° course.

GENERAL EMERGENCY PROCEDURES

1. **Disengage AP/YAW Damp**
   a) Simultaneously regain control of aircraft and hold down Autopilot Disconnect/Trim Interrupt button.
   b) Pull A/P circuit breaker.
   c) Release A/P Disconnect/Trim Interrupt button

2. **The following conditions will cause AP to automatically disengage:**
   a) External power failure.
   b) Actuating manual electric trim.
   c) Internal Flight Control System failure.
   d) With KCS 55A system a loss of compass valid, (displaying HDG flag) disengages the AP and FD when a mode using Heading information is engaged. With compass flag present, only FD and vertical modes can be selected.

3. **Manual Electric pitch trim can be disengaged by:** Press AP DISC/TRIM INTERRUPT switch and hold down until recovery can be made. Then turn **off AVIONICS MASTER switch** and manually retrim the airplane using the manual trim control wheel. After the airplane is trimmed out, pull the (PITCH TRIM) breaker and turn the **AVIONICS MASTER** switch back on.

4. **Engine Failure in Multi-engine Aircraft (Coupled)**
   a) Simultaneously control aircraft and hold down Autopilot Disconnect/Trim Interrupt button.
   b) Release button.
   c) Follow basic Airplane Flight Manual single engine procedures.
   d) Airplane rudder and aileron axes should be manually trimmed prior to engaging autopilot for single engine operations.

   *CAUTION: Exact Emergency Procedures vary from aircraft to aircraft because of differences in electrical systems, instrument arrangements and flight characteristics. **Consult the Flight Manual Supplement** for your particular aircraft for detailed instructions on emergency procedures.

System Weight and Power Requirements

KFC 200 Flight Director/Autopilot

Components for 2-axis system:
- KCS 55A Silver Crown Compass System
- KI 256 3'' Flight Command Indicator
- KC 295 Flight Computer with Altitude Sensor
- KS 270 Pitch Servo w/KM 275 Mount/Capstan
- KS 271 Aileron Servo w/KM 275 Mount/Capstan
- KA 285 Mode Annunciator
- KC 290 Mode Controller
- KS 272 Trim Servo w/KM 276 Mount/Capstan

TOTAL FOR 2-AXIS SYSTEM
28.3 lbs. (12.9 kg) 14V/15.5 AMP
28V/9.5 AMP

Additional Components for 3-axis system:
- KS 271 Rudder Servo w/KM 275 Mount/Capstan
- KC 291 Yaw Controller
- KC 296 Yaw Computer
- KRG 331 Yaw Rate Sensor

TOTAL FOR 3-AXIS SYSTEM
32.8 lbs. (15.0 kg) 14V/18.1 AMP
28V/11.5 AMP

KAP 200 Autopilot System

Components for 2-axis system:
- KCS 55A Silver Crown Compass System
- KG 258 Gyro, panel-mounted
- KC 295 Flight Computer with Adapter Card
- KS 270 Pitch Servo w/KM 275 Mount/Capstan
- KS 271 Aileron Servo w/KM 275 Mount/Capstan
- KA 285 Mode Annunciator
- KC 292 Mode Controller
- KS 272 Trim Servo w/KM 276 Mount/Capstan

TOTAL FOR 2-AXIS SYSTEM
28.1 lbs. (12.9 kg) 14V/14.7 AMP
28V/8.7 AMP

Additional Components for 3-axis system:
- KS 271 Rudder Servo w/KM 275 Mount/Capstan
- KC 296 Yaw Computer
- KRG 331 Yaw Rate Sensor

TOTAL FOR 3-AXIS SYSTEM
32.6 lbs. (14.9 kg) 14V/18.1 AMP
28V/11.5 AMP

The third axis may be installed with or without the KC 291 Yaw Mode Controller.

King Warranty Service

Warranty service for your King KAP/KFC 200 Flight Control System is available at hundreds of 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 equipped with all the required test facilities and training to professionally check and maintain your King avionics system. And they're backed by a full staff of King field engineers and product specialists, on-call to handle any service question that might arise.

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

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

This King warranty card system is honored by King Service Centers throughout the world as unquestioned proof of your warranty authorization. **Keep your King Warranty Card in your airplane at all times** to verify your warranty status at any King Service Center. It's your key to outstanding warranty service protection.

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5/84 006-8262-00 20K

Printed in U.S.A.