

KING
King Radio Corp.
Olathe, Kansas

PILOT'S OPERATING HANDBOOK AND
FAA APPROVED
AIRPLANE FLIGHT MANUAL SUPPLEMENT
FOR
BEECHCRAFT A36 (S/N E-1487, E-1425 AND UP)
AND A36TC (S/N EA-1 AND UP)
KING KFC 200 AUTOMATIC FLIGHT CONTROL SYSTEM WITH FLIGHT DIRECTOR

Mod. No. _____
Ser. No. _____
Reg. No. _____

This supplement must be used in conjunction with the Pilot's Operating Handbook and FAA Approved Flight Manual when the King KFC 200 Automatic Flight Control System is installed in accordance with STC SA1496CE. The information contained herein supplements or supersedes the basic handbook only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Pilot's Operating Handbook.

FAA Approved _____

for Barry D. Clements,
Chief Aircraft Certification Program
Central Region
Wichita, Kansas

Date: 3 July 1980

THIS DOCUMENT MUST BE CARRIED
IN THE AIRPLANE AT ALL TIMES

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SECTION I

General

This manual is to acquaint the pilot with the operation of the KFC 200 Automatic Flight Control System with optional Flight Director as installed in the Beechcraft A36/A36TC airplane. The airplane must be operated within the limitations herein specified.

The KFC 200 is certified in this airplane with 2 axis autopilot control, pitch and roll, or 3 axis control if optional yaw damper is installed. The 3rd axis (Yaw), when installed, provides yaw damping and turn coordination whenever the autopilot is engaged. With the installation of the optional KC 291 Yaw Damp Mode Controller, yaw damping and turn coordination are available with or without the basic autopilot engaged. Both 2 axis and 3 axis systems are described in this manual. The system may be operated as a flight director alone with the pilot steering the airplane to the flight director command presentation or the autopilot can be engaged to automatically steer the airplane to the flight director command presentation.

The airplane is equipped with an electric trim system which is controlled by pilot operation of the trim switch. When autopilot coupled, the autopilot uses the electric trim system to accomplish automatic trimming to unload the autopilot elevator servo so that autopilot disengagement does not result in transient airplane motion. An autotrim/electric pitch trim monitor is provided in the autopilot. Autotrim and/or electric pitch trim faults are visually annunciated on the Mode Annunciator and accompanied by an audible warning.

SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

ALT	Altitude or Altitude Hold
AP	Autopilot
APPR	Approach
ARM	System Arm for Capture
BC	Back Course
CDI	Course Deviation Indicator or Control
CPLD	Coupled
DISC	Disconnect
FCS	Flight Control System
FD	Flight Director
FDI	Flight Director Indicator
GA	Go Around
HDG	Heading Select
LOC	Localizer
NAV	Navigation
PAH	Pitch Attitude Hold
PNI	Pictorial Navigation Indicator
YD	Yaw Damper

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SECTION III

Emergency Procedures

1. Autopilot/Yaw Damper Malfunctions

- (a) AP DISC/TRIM INTERRUPT Switch - Hold the Control Wheel firmly and press the AP DISC/TRIM INTERRUPT Switch.

2. Electric Trim Malfunction (either manual electric or autotrim)

- (a) AP DISC/TRIM INTERRUPT Switch - Press and hold down until recovery can be made.
(b) Avionics MASTER - OFF
(c) Airplane - manually retrim.
(d) Pitch Trim circuit breaker - Pull.

CAUTION

WHEN DISCONNECTING THE AUTOPILOT AFTER A TRIM MALFUNCTION, HOLD THE CONTROL WHEEL FIRMLY (UP TO 45 POUNDS OF FORCE ON THE CONTROL WHEEL MAY BE NECESSARY TO HOLD THE AIRPLANE LEVEL).

3. Autopilot/Yaw Damper Disengagement

- (a) The Autopilot/YD can be manually disengaged by the following methods:

1. Press the AP DISC/TRIM INTERRUPT switch on the pilot's control wheel.
2. Move the Autopilot ON-OFF handle to the OFF position to disengage the Autopilot and YD if not equipped with a KC 291 Yaw Controller.
3. Engage the Go-Around mode (disengages Autopilot only).
4. Turn off the AVIONICS MASTER.
5. Operate manual electric trim switch UP or DN (disengages Autopilot only).
6. Cycle the YD ON-OFF switch on the KC 291 Yaw Controller to engage/disengage the YD (if so equipped).

4. The following conditions will cause the Autopilot to automatically disengage:

- (a) Power failure.
(b) Internal Flight Computer power supply failure.
(c) With the KCS 55A compass system, a loss of compass valid (displaying HDG flag) disengages the Autopilot and Flight Director when a mode using heading information is engaged. With the HDG flag present only vertical modes can be selected for FD or Autopilot operation.

5. Maximum altitude losses due to autopilot malfunctions.

<u>Configuration</u>	<u>Alt Loss</u>
Cruise, Climb, Descent	400'
Maneuvering	75'
APPR	70'

CAUTION

WHEN THE AUTOPILOT IS ENGAGED, MANUAL APPLICATION OF A FORCE TO THE PITCH AXIS OF THE CONTROL WHEEL FOR A PERIOD OF THREE SECONDS OR MORE WILL RESULT IN THE AUTOTRIM SYSTEM OPERATING IN THE DIRECTION TO CREATE A FORCE OPPOSING THE PILOT. THIS OPPOSING MISTRIM FORCE WILL CONTINUE TO INCREASE AS LONG AS THE PILOT APPLIES A FORCE TO THE CONTROL WHEEL, AND WILL ULTIMATELY OVERPOWER THE AUTOPILOT. IF THE AUTOPILOT IS DISENGAGED UNDER THESE CONDITIONS, THE PILOT MAY BE REQUIRED TO EXERT CONTROL FORCES IN EXCESS OF 50 POUNDS TO MAINTAIN THE DESIRED AIRPLANE ATTITUDE. THE PILOT WILL HAVE TO MAINTAIN THIS CONTROL FORCE WHILE HE MANUALLY RETRIMS THE AIRPLANE.

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5. FCS Warning Flags and Annunciators Designation and Operation:

FD	The KI 256 Flight Director Indicator does not have a warning flag. However, the command bars will be biased out of view whenever the system is invalid or a FD mode is not engaged.
HDS	This warning flag mounted in the Pictorial navigation Indicator will be in view whenever the directional gyro information is invalid. If a HDS invalid occurs with either NAV, APPR or HDS modes selected the AP and/or FD is disengaged. Basic FD mode may then be re-engaged along with any vertical mode and the AP re-engaged.
TRIM	The TRIM warning light, located in the lower right corner of the annunciator panel, will flash and be accompanied by an audible warning whenever autotrim and/or manual electric pitch trim failures occur. The trim servo motor running without a command is monitored on both trim modes. The trim servo motor not running when commanded to run, and the trim servo motor running in the wrong direction are monitored on Autotrim only. The TRIM warning light flashes 4 to 6 times and the audible warning sounds when the test switch on the Mode Controller is depressed.
AP	The AP light on the annunciator panel will flash at least 6 times and a 2 second audio warning will sound any time the autopilot disconnects.
GS	The GS valid (GS pointer being in view on KI 525A) has to be present before GS may couple. If, after GS CPLD the valid is lost, the system will flash the GS Annunciator and transfer from GS to PAW. If the GS valid returns the system will revert back to GS Coupled.
NAV	The NAV or APPR Modes (ARM or CPLD) may be selected and will function with or without a NAV warning flag present.

6. Before engaging Flight Control System:

- (a) Check that all circuit breakers for the system are in.
- (b) Allow sufficient time for gyros to come up to speed and system warmup (3-4 minutes).

7. Preflight Check: Steps (a) through (d) must be performed prior to each flight.

- (a) With no modes engaged and power applied to all systems, depress the test button on the MODE CONTROLLER. All mode annunciators will be illuminated on the annunciator panel and the red autotrim failure light will flash. At least four flashes must be observed to indicate proper operation of the autotrim/manual electric trim monitor and an audible warning should sound. The three marker lights will also illuminate during test. The YD ON annunciator on the KC 291 will also illuminate.

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SECTION IV (Cont'd)

7. (b) Engage the FD and AP Mode and apply force to the controls to determine that the Autopilot can be overpowered.
- (c) Check that the pilot's emergency disconnect switch disconnects the autopilot.
- (d) Perform the following manual electric trim checks:
 1. Actuate the left side of the pilot's trim switch to the fore and aft positions. The trim solenoid should engage, but the trim should not run. (Solenoid engagement may be confirmed by additional force required to move trim wheel.)
 2. Actuate the right side of the pilot's trim switch to the fore and aft positions. The trim solenoid should not engage and the trim should not run.
 3. Grasping the manual trim wheel, run the electric trim and check overpower capability.
 4. Press the A/P DISC/TRIM INTERRUPT switch down and hold. The manual electric trim will not operate either up or down.
 5. Set trim to takeoff position.
- (e) The following checks should be performed prior to the first flight of the day:
 1. Engage the FD and AP and put in a pitch up command as indicated on the command bars using the vertical trim switch on the KC 290 Mode Controller. Hold the control column from moving and observe the autotrim run in the nose-up direction after approximately a 3 second delay. Use the vertical trim switch and put in a nose-down command as indicated on the command bars. Hold the control column and observe the autotrim run in the nose-down direction after approximately a 3 second delay.
 2. Engage the HDG mode and AP. Set the HDG bug to command a right turn. The control wheel will rotate clockwise. Set the HDG bug to command a left turn. The control wheel will rotate counterclockwise.
 3. Run the manual electric trim from full nose up to full nose down. The time required should be 42 ± 8 seconds.

CAUTION

OPERATION OF THE AUTOPILOT ON THE GROUND MAY CAUSE THE AUTOTRIM TO RUN BECAUSE OF BACK FORCE GENERATED BY ELEVATOR DOWNSPRINGS OR PILOT INDUCED FORCES. THEREFORE, DISENGAGE THE Autopilot AND CHECK THAT THE AIRPLANE MANUAL PITCH TRIM IS IN THE TAKEOFF POSITION PRIOR TO TAKEOFF.

8. In-Flight Operation:

(a) Engage Procedure:

After take-off, clean up the airplane and establish a climb. Engage the FD mode first, hold the flight controls and engage AP. The pitch attitude will lock on any attitude up to 15 degrees. Engaging the CMS switch allows the pilot to momentarily revert to manual control, while retaining his previous modes, except GA, and to conveniently resume that profile at his discretion. The optional Yaw Damper engages automatically when the Autopilot is engaged or may be engaged separately by the YAW DAMP switch on the Yaw Mode Controller, if so equipped.

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(b) Disengage Procedure:

Check the airplane trim by monitoring the command bars before disengaging AP. While holding the flight controls disengage the system by one of the following methods: Depressing the pilot's A/P DISC switch, by operation of the manual trim switch or the AP engage lever on the Mode Controller.

The AP light on the annunciator panel will flash at least six times and the aural alert will sound for 2 seconds to indicate the AP is disengaged. To deactivate the Flight Director System, depress the FD switch on the Mode Controller or press the A/P DISC/TRIM INTERRUPT switch.

If the airplane is equipped with a Yaw Damper without a KC 291, the YD will disconnect any time the AP disconnects. If the airplane is equipped with a Yaw Damper with a KC 291 the YD will disconnect with the AP DISC/TRIM INTERRUPT switch or by the YD switch on the KC 291. Activating the manual trim or disconnecting the AP with the AP switch on the KC 290 Mode Controller will NOT disengage the YD.

(c) Flight Director Mode (FD):

The FD must be engaged before the AP can be engaged. The FD mode alone indicates PAM and wings level. The pilot may choose to fly the FD manually without the AP engaged by depressing the FD switch on the Mode Controller and selecting any of the other modes he wishes to follow. The FD may be disengaged by depressing the FD switch on the MODE CONTROLLER at any time the AP is not engaged or by pressing the A/P DISC/Trim INTERRUPT switch with or without the AP engaged. FD Mode engagement is displayed on the annunciator panel.

(d) Altitude Hold Mode (ALT):

When the ALT switch on the MODE CONTROLLER is pressed the airplane will maintain the pressure altitude existing at the time the switch is depressed. For smooth operation, engage the ALT at no greater than 600 ft. per minute climb/descent. The ALT will automatically disengage when Glideslope couples or the Go-Around switch is depressed. ALT hold may be turned off at any time by depressing the ALT switch. ALT engagement is displayed on the annunciator panel.

NOTE

THE VERTICAL TRIM SWITCH (LOCATED ON THE KC 290 MODE CONTROLLER PANEL) MAY BE USED TO CHANGE OR TRIM THE ALTITUDE UP OR DOWN AT 500 TO 700 FPM WITHOUT DISENGAGING THE MODE. THE NEW PRESSURE ALTITUDE THAT EXISTS WHEN THE SWITCH IS RELEASED WILL BE HELD.

(e) Heading Mode (HDG):

Set the heading bug to desired heading on the PNI, depress the HDG switch on the Mode Controller and HDG will be displayed on the annunciator panel. The airplane will turn to and hold the heading selected. The pilot may then choose any new heading by merely setting the bug on a new heading. The airplane will automatically turn in the direction the heading bug is turned. To disengage the HDG Mode, depress the HDG switch on the MODE CONTROLLER and observe the HDG light go out on the annunciator panel. The HDG Mode will automatically disengage when APPR or NAV CPLD is achieved.