KING
87S029-6*

FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR

BEECH MODELS A36 and B36TC

WITH

KING KFC 200 AUTOMATIC FLIGHT CONTROL SYSTEM

LOG OF REVISIONS

Rev. No.	Page Number(s)	Description	Date Of Revision	Approved By*
1	3 ALL	Added airspeed restriction with altitude. Reformatted entire manual.	1/1/84	[signature] Coordinator DAS4CE

*For Authorized FAA Representative

KING
King Radio Corp.
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BFS029-5

FAA APPROVED
AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR

BEECH MODELS A36 & B36TC
A36 (S/N E-1946, E-2104, E-2111 AND UP)
B36TC (S/N EA-320, EA-389 AND UP)

KING KFC 200
AUTOMATIC FLIGHT CONTROL SYSTEM

Ser. No. E-2788

Reg. No. N3455F

The information contained in this manual is FAA Approved material which, along with the FAA Approved Airplane Flight Manual, placards and instrument markings, is applicable to the operation of the airplane when modified by the installation of the King KFC 200 Automatic Flight Control System as per STC SA1779CE-D.

FAA Approved Ralph V. Cole

Ralph V. Cole
DAS Coordinator
King Radio Corporation
DAS4CE

Date: November 11, 1983

KING
BFS029-3

BEECH MODELS A36 and B36TC

AIRPLANE FLIGHT MANUAL SUPPLEMENT

006-0408-01

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FAA Approved
Date: 11/11/83
Revision 1

SECTION I - GENERAL

This manual is to acquaint the pilot with the operation of the KFC 200 Automatic Flight Control System, as installed in the Beech Models A36 and B36TC airplanes. The airplane must be operated within the limitations herein specified.

The KFC 200 is certified in these airplanes 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 airplanes are 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.

SECTION I
GENERAL

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
CPLD	Coupled
CWS	Control Wheel Steering
DISC	Disconnect
FCS	Flight Control System
GS	Glide Slope
HDG	Heading
LOC	Localizer
NAV	Navigation
PAH	Pitch Attitude Hold
PNI	Pictorial Navigation Indicator
TRIM INTER	Trim Interrupt
YD	Yaw Damper

SECTION II - LIMITATIONS

A. During autopilot operation, the pilot must be seated at the controls with seat belt fastened.

B. Maximum airspeed for autopilot operation: 185 KIAS (Decrease 4 KIAS per 1000 ft. above 16,000 ft. for B36TC only).

Minimum airspeed for autopilot operation: 80 KIAS

C. The autopilot and yaw damper must be disengaged during takeoff and landing.

D. System approved for Category I operation only (APPR or BC selected).

E. Do not operate AP with more than 1/8 tank fuel imbalance.

Autopilot attitude command limits:

Pitch $\pm 15^{o}$
Roll $\pm 25^{o}$

PLACARDS:

A/P DISC TRIM INTERRUPT

Location: Pilot's control wheel, left horn.

CWS

Location: Pilot's control wheel, left horn.

TRIM DN
UP

Location: Pilot's control wheel, left horn.

3 AXIS AP CONTROL

Location: Immediately adjacent to the KC 292. (If equipped with a 3rd axis without KC 291.)

CONDUCT AFCS PREFLIGHT CHECK PRIOR TO FLIGHT IN ACCORDANCE WITH FLIGHT MANUAL.

Location: Below the KC 292 Mode Controller.

NOTE

IN ACCORDANCE WITH FAA RECOMMENDATIONS, USE OF "ALTITUDE HOLD" MODE IS NOT RECOMMENDED DURING OPERATION IN SEVERE TURBULENCE.

SECTION III - EMERGENCY PROCEDURES

A. In case of Autopilot Malfunction: (accomplish Items 1 & 2 simultaneously)

1. Airplane Control Wheel - **GRASP FIRMLY** and regain aircraft control.

2. **A/P DISC/TRIM INTERRUPT** Switch - **PRESS and HOLD.**

3. **A/P DISC/TRIM INTERRUPT** Switch - **RELEASE** while observing pitch trim wheel. If pitch trim wheel is in motion, follow the Electric Trim Malfunction Procedure.

B. In case of Electric Trim Malfunction (either manual electric or autotrim)

1. **A/P DISC/TRIM INTERRUPT** Switch - **PRESS & HOLD** throughout recovery.

2. **AVIONICS MASTER - OFF**

3. Airplane - **RETRIM** manually

4. **PITCH TRIM** Circuit Breaker - **PULL.**

5. **AVIONICS MASTER - ON.**

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).

CAUTION

DO NOT HELP THE AUTOPILOT AS THE AUTOPILOT WILL RUN THE PITCH TRIM TO OPPOSE YOUR HELP.

C. Autopilot and/or YD Disengagement

1. The Autopilot/YD can be manually disengaged by the following methods:

   a) Press the A/P DISC/TRIM INTERRUPT switch on the pilot's or co-pilot's control wheel.

   b) Operate manual electric trim switch UP or DN. (Will disengage A/P but not YD.)

SECTION III
EMERGENCY PROCEDURES

E. Maximum Altitude losses due to autopilot malfunction:

Configuration	Alt Loss
Cruise, Climb, Descent	480'
Maneuvering	80'
APPR	80'

SECTION IV - NORMAL PROCEDURES

A. SYSTEM OPERATION

1. The **BATTERY MASTER** Switch function is unchanged.

2. The **AVIONICS MASTER** Switch supplies 28 vdc power to the avionics bus bar, the **COMP SYS**, **A/P POWER** and **PITCH TRIM** circuit breakers.

3. The KFC 200 is controlled by the following circuit breakers:

   A/P POWER

   This supplies power to the KC 295 Flight Computer, KC 292 Mode Controller, KA 285 Annunciator Panel and AP Pitch and Roll Servos. When optional Yaw Damper is installed, this breaker also supplies power to the KC 296 Yaw Computer, the Yaw Servo, and optional KC 291.

   COMP SYS

   This controls power to the KCS 55ACompass System and the optional KRG 331 Yaw Rate Gyro if the airplane is not equipped with an inverter.

SECTION IV
NORMAL PROCEDURES

PITCH TRIM

This supplies power to the KFC 200 trim system and the manual electric trim.

4. Pilot's Control wheel switch functions.

A/P TRIM
DISC INTERRUPT

This emergency disconnect switch will disengage the YD and/or A/P, and interrupt power to the electric trim system. In the event of electric trim or autotrim failure the switch can be held depressed, which removes all power from the trim system to allow the pilot time to turn off the AVIONICS MASTER Switch and pull the PITCH TRIM circuit breaker.

CWS

This switch, when depressed and held, will allow the pilot to manually fly the airplane without disengaging the A/P or YD. When the switch is released, the A/P will resume control (within the pitch and roll attitude limits).

The CWS switch will resync PAH or ALT hold. When the CWS is held depressed, manual electric trim may be operated without disengaging the A/P.

TRIM DN
UP

Manual electric pitch trim is activated by a dual action type switch that requires both halves be moved simultaneously for actuating up or down trim commands. Operation of the left portion of the manual electric pitch trim switch will disengage the A/P lever switch on the Mode Controller (except when CWS switch is held depressed as previously noted).

5. FCS Warning Flags and Annunciators Designation and Operation.

HDG

This warning flag, mounted in the Pictorial Navigation Indicator, will be in view whenever the compass system, internal power supply, heading servo loop, or remote directional gyro are invalid. If a HDG invalid occurs with either NAV, APPR, or HDG Modes selected, the A/P is disengaged. Basic A/P mode may then be re-engaged and desired vertical modes selected.

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 for both autotrim and manual electric pitch trim operations. The trim servo motor not running when commanded to run and the trim servo motor running in the wrong direction are monitored for autotrim operation only.

GS

The GS valid (GS pointer being in view on the KI 525A) has to be present before glide slope may couple. If after GS CPLD, the valid is lost, the system will flash the GS Annunciator and revert from GS CPLD back to PAH. If the GS valid returns, the system will revert back to GS CPLD.

NAV

The NAV or APPR Modes (ARM or CPLD) may be selected and will function with or without a NAV warning flag present.

AP (FLASHING)

Upon A/P disengagement the AP light on the KA 285 Annunciator panel will flash at least 4 times and an aural alert will sound for about 2 seconds.

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 warm-up (3-4 minutes).

B. PREFLIGHT CHECKS: (Run prior to each flight.)

1. Verify that all modes are disengaged and depress the test button on the Mode Controller and hold. All KFC 200 System mode annunciators, the marker lights on the KA 285 and the YD ON light on the KC 291 (if installed) should illuminate. In addition, the red trim failure light in the annunciator panel should flash at least four but not more than six times and be accompanied by an aural alert to indicate correct trim monitoring.

2. With the A/P disengaged, run the following manual electric pitch trim checks:

a) Actuate the left-side switch to the fore and aft positions, the trim should not run.

Actuate the right-side switch to the fore and aft positions, the trim should not run.

b) Grasping the manual trim wheel, run the trim both up and down and check the overpower capability. (Check that the trim indicator moves with the wheel.)

c) Press the AP DISC/TRIM INTERRUPT switch down and hold. The manual electric pitch trim will not operate either up or down.

CAUTION

IF AUTOPILOT OR ELECTRIC TRIM FAILS PREFLIGHT TEST, THE A/P POWER AND PITCH TRIM CIRCUIT BREAKERS SHOULD BE PULLED. NEITHER THE ELECTRIC TRIM NOR THE AUTOPILOT SHOULD BE USED.

3. Engage the Autopilot. Apply force to all axes and determine that the Autopilot can be overpowered.

4. Using the A/P DISC/TRIM INTER Switch, disengage the A/P.

5. Set Manual Trim for takeoff.

SECTION IV
NORMAL PROCEDURES

C. DAILY CHECKS: (Run prior to first flight each day.)

1. Engage the A/P and put in a pitch up command using the vertical trim switch on the KC 292 Mode Controller. Hold the control column from moving and observe the autotrim run in the nose up direction after approximately a 3 second delay. Momentarily depress the CWS switch. Use the vertical trim switch and put in a nose down command. Hold the control column and observe the autotrim run in the nose down direction after approximately 3 seconds.

2. Engage A/P and HDG. 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. Disengage A/P. AP light in KA 285 will flash and an aural tone will sound for 2 seconds.

4. Set manual trim for takeoff.

NOTE

IF THE A/P CIRCUIT BREAKER IS TRIPPED, THE RED "TRIM" FAILURE LIGHT ON THE ANNUNCIATOR PANEL WILL BE DISABLED AND THE AUDIBLE WARNING WILL CONTINUOUSLY SOUND INDICATING THAT THE FAILURE LIGHT IS DISABLED. IN THIS EVENT THE "PITCH TRIM" CIRCUIT BREAKER SHOULD BE PULLED AND INFLIGHT TRIM ACCOMPLISHED BY USING THE MANUAL PITCH TRIM WHEEL.

CAUTION

OPERATION OF THE AUTOPILOT ON THE GROUND MAY CAUSE THE AUTOTRIM TO RUN BECAUSE OF SYSTEM OR PILOT INDUCED FORCES. THEREFORE, DISENGAGE THE AP AND CHECK THAT THE AIRPLANE MANUAL PITCH TRIM IS IN THE TAKEOFF POSITION PRIOR TO TAKEOFF.

D. IN-FLIGHT OPERATION

1. Engage Procedure:

After takeoff, clean up aircraft and establish climb. Engage the A/P. The pitch attitude will lock on and hold any attitude up to $\pm 15^{\circ}$. Engaging the CWS switch allows the pilot to momentarily revert to manual control while retaining his previous modes, and to conveniently resume that profile at his discretion.

SECTION IV
NORMAL PROCEDURES

NOTE

THE OPTIONAL YAW DAMPER SYSTEM ENGAGED AUTOMATICALLY WHEN THE A/P IS ENGAGED OR MAY BE ENGAGED SEPARATELY BY THE USE OF THE YAW DAMPER SWITCH ON THE YAW MODE CONTROLLER IF THE AIRPLANE IS SO EQUIPPED.

2. Disengage Procedure:

While holding the flight controls, disengage the system by one of the following methods: depressing the pilot's disconnect 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 four times and the aural alert will sound for about 2 seconds to indicate the A/P is disengaged. All other modes will also disengage.

If the airplane is equipped with a Yaw Damper without a KC 291, the YD will disconnect any time the A/P disconnects. If the airplane is equipped with a Yaw Damper with a KC 291, the YD will disconnect with the A/P DISC/TRIM INTERRUPT switch or by the YD switch on the KC 291. Activating the manual trim or disconnecting the A/P with

the A/P switch on the KC 292 Mode Controller will NOT disengage the YD.

3. Autopilot Mode (A/P):

The A/P must be engaged before any other mode can be engaged. The A/P mode alone indicates PAH and wings level. The A/P will automatically follow any other modes engaged. Disengaging the A/P disengages all other modes.

NOTE

THE "VERTICAL TRIM" SWITCH, LOCATED ON THE MODE CONTROLLER, MAY BE USED TO CHANGE THE PITCH ATTITUDE AT A RATE OF ONE DEGREE PER SECOND.

4. 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 500 ft. per minute climb/descent. The ALT will automatically disengage when Glideslope couples. ALT hold may be turned off at any time by depressing the ALT switch. ALT engagement is displayed on the annunciator panel.

SECTION IV
NORMAL PROCEDURES

NOTE

THE VERTICAL TRIM SWITCH, (LOCATED ON THE KC 292 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.

5. Heading Mode (HDG):

Set the heading bug to the desired heading on the PNI, engage A/P and depress the HDG switch on the Mode Controller. AP 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 toward the heading bug. 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.

6. Navigation Mode (NAV):

The navigation mode may be selected by tuning the NAV receiver to the desired frequency,

setting the CDI to the desired radial and, with the A/P engaged, depressing the NAV switch on the MODE CONTROLLER. If the NAV switch is engaged with a centered needle on the CDI, the mode will go directly to NAV CPLD as displayed on the annunciator panel. If a condition requiring a capture exists at mode engagement, the system will go to NAV ARM and the pilot is required to set up the desired intercept angle using HDG or A/P Mode. NAV may be disengaged by depressing NAV switch or by engaging HDG or APPR when in NAV CPLD.

CAUTION

THE "NAV" MODE OF OPERATION WILL CONTINUE TO PROVIDE AIRPLANE COMMANDS AND/OR CONTROL WITHOUT A VALID VOR/LOC SIGNAL (NAV FLAG IN VIEW). ALSO ERRONEOUS NAVIGATION INFORMATION MAY RESULT FROM COMM RADIO INTERFERENCE WITH THE NAV RADIO. THIS ERRONEOUS INFORMATION MAY CAUSE PREMATURE NAV CAPTURES AS WELL AS ERRONEOUS STEERING INFORMATION. SHOULD THIS OCCUR RE-SELECT HDG MODE AND THEN RE-SELECT NAV MODE.

7. Approach Mode (APPR):

The Approach Mode may be selected by tuning the NAV receiver to the

desired VOR or LOC frequency, setting the CDI to the desired radial or inbound heading, engaging A/P and depressing the APPR switch on the Mode Controller. The annunciator will indicate APPR ARM until the course is intercepted unless the APPR switch is engaged with the wings level and there is a centered needle on the CDI. In that situation, the mode will go directly to APPR CPLD as displayed on the annunciator panel. The system can intercept at any angle up to 90° and will always turn toward the course pointer. See approach procedure for more detail. APPR mode can be disengaged by engaging HDG or NAV when in APPR CPLD. The annunciator panel indicates the status of the approach mode.

CAUTION

THE "APPR" MODE OF OPERATION WILL CONTINUE TO PROVIDE AIRPLANE COMMANDS AND/OR CONTROL WITHOUT A VALID VOR/LOC SIGNAL (NAV FLAG IN VIEW). ALSO ERRONEOUS NAVIGATION INFORMATION MAY RESULT FROM COMM RADIO INTERFERENCE WITH THE NAV RADIO. THIS ERRONEOUS INFORMATION MAY CAUSE PREMATURE APPR CAPTURES AS WELL AS ERRONEOUS STEERING INFORMATION. SHOULD THIS OCCUR RE-SELECT HDG MODE AND THEN RE-SELECT APPR MODE.

8. Back Course Mode (BC):

For Back Course (BC) operation, proceed as for front course approach, hut engage BC after selecting APPR. The BC switch reverses the signals in the computer and cannot be engaged without a LOC frequency selected. BC status is indicated on the annunciator panel. BC Mode can be disengaged by depressing either the BC or APPR switches, or by selecting other than a LOC frequency on the NAV receiver.

9. Vertical Trim (UP/DN):

Operation of the vertical trim switch on the Mode Controller provides a convenient means of adjusting the ALT Hold or PAH Angle function without disengaging the mode.

10. Yaw Damper Mode (YAW DAMP):

The optional 3rd Axis engages automatically when the A/P is engaged or may be engaged separately by the use of the YAW DAMP Switch on the Yaw Controller

if so equipped. The 3rd Axis provides yaw damping plus turn coordination when engaged.

E. VOR PROCEDURES:

1. Tune NAV Receiver to appropriate frequency.

2. Set desired Heading with the HDG BUG to intercept radial and engage A/P and HDG (Maximum recommended intercept is 90°).

3. Select desired radial and engage NAV. The airplane will remain on HDG as indicated on the annunciator panel and ARM on the NAV Mode. When the airplane intercepts the beam, the system will automatically couple and track in NAV Mode and indicate CPLD on the annunciator panel.

4. A new course may be selected over the VOR station, when operating in the NAV Mode, by selecting a new radial when the To-From indication changes.

5. For VOR approach, see approach procedure.

SECTION IV
NORMAL PROCEDURES

NOTE

FOR LARGE COURSE CHANGES (10^{o} OR MORE) RECOMMENDED PROCEDURE IS TO REVERT FROM NAV CPLD TO HDG MODE. THEN RE-SELECT NAV AND INTERCEPT NEW RADIAL AFTER LEAVING THE VOR CONE AREA.

F. APPROACH PROCEDURES:

1. Tune ILS or VOR.

2. Set CDI to front course inbound heading.

3. Set Heading Bug and engage A/P and HDG to intercept course beam at any angle. (Maximum recommended intercept angle ~ 90^{o}).

4. Engage APPR and note APPR ARM on the annunciator panels.

5. When airplane approches the beam, APPR will couple, HDG will decouple, A/P will track LOC or VOR, and CPLD will illuminate on the annunciator panel.

6. When the glideslope beam is intercepted, the glideslope (GS) will couple automatically and indicate GS on the annunciator panel. If the ALT Mode was engaged prior to intercepting the glideslope, it will automatically disengage when GS couples.

A/P will now track LOC and GS. Adjust throttles to control speed on descent. Set the HDG bug for missed approach but do not engage HDG.

7. When the middle marker signal is received, the system will automatically switch to a more stable track mode.

NOTE

OPERATION OF THE MARKER TEST FUNCTION AFTER APPROACH COUPLED WILL REDUCE THE FLIGHT CONTROL SYSTEM GAINS. IF THIS SHOULD OCCUR, THE APPROACH MODE SHOULD BE RECYCLED.

G. LANDING OR MISSED APPROACH.

1. Landing: Disengage A/P and land.

2. Missed Approach: Disengage Autopilot. Refer to the Operator's Manual for the proper balked landing procedure.

H. BACK COURSE PROCEDURE:

Same as front course except that BC is engaged after APPR is engaged and the airplane must be set for descent manually by holding the Vertical Trim Control DN on the MODE CONTROLLER if in ALT Mode or by establishing the desired PAH using the CWS if in PAH.

SECTION V - PERFORMANCE

No Change.

CIVIL AVIATION AUTHORITY

CAA CHANGE SHEET NO 6 ISSUE 1 TO THE INTEGRITY AIR SERVICES SUPPLEMENT NUMBER 190-00140-04 FOR THE BEECH A36 PILOT'S OPERATING HANDBOOK

(CAA Ref:355/55417)

Serial No: E-2788 **Registration Mark:** G-FOZZ

ADDITIONAL LIMITATIONS AND INFORMATION FOR UNITED KINGDOM CERTIFICATION

The limitations and information contained herein either supplement or, in the case of conflict, override those in the flight manual.

The Limitations listed below supersede those shown in the supplement.

Page 3, Paragraph 2, first bullet point:

Terminal and non-precision approaches are prohibited.

Page 4, Paragraph 3

Terminal Navigation is prohibited.

Pages 4 and 5, Paragraph 4

Instrument approach is prohibited.

Pages 4 and 5, Paragraph 4

Sub-paragraphs (a), (b) and (e) are not approved and shall not be used.

- End -

To be inserted in the Beech A36 flight manual facing page 1 of the Integrity Air Services supplement number 190-00140-04 and the CAA Revisions Record Sheet amended accordingly

CAA Approved
26 MARCH 2002