SECTION V

FAA

AIRPLANE FLIGHT MANUAL

SUPPLEMENTS

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RAYTHEON AIRCRAFT
BEECH® DUKE B60
FAA APPROVED AIRPLANE FLIGHT MANUAL
P/N 60-590000-11
LOG OF SUPPLEMENTS

FAA Supplement must be in the airplane for flight operation when subject equipment is installed.

Part number	*Subject*	*Rev No.*	*Date*
60-590001-11	Continuous Pressure Operated Surface Deice System	4	August 31, 1973
60-590001-13	Goodrich Electrothermal Propeller Deice System	4	June, 1981
60-590001-17	Flight In Known Icing Conditions	7	September, 1998
60-590001-19	Woodward Electronic Propeller Synchronizer	1	August 31, 1973
60-590001-21	Area navigation System, King KNC-610 and King KN-74	3	August 15, 1975
60-590001-33	BEECHCRAFT H-14 Autopilot	4	August 31, 1973
60-590001-37	Reduced Power Procedures, Duke B60, For Certification in Switzerland, Germany and Austria	2	July, 1980
60-590001-39	Collins ANS-31, NCS-31 Area Navigation System		October 24, 1975
60-590001-41	AirData AD611/D RNAV/VNAV System	1	November, 1979
60-590001-43	Collins ANS-351 Area Navigation System		December 29, 1977
60-590001-45	Bendix NP-2041A Nav Computer Programmer		February, 1979
60-590001-51	King KNS-81 Integrated Navigation System		August, 1980
60-590001-53	King KNR-665A Area Navigation System		September, 1980
101-590010-175	AirData RNAV-612 Area Navigation System	1	December, 1983
131787	AiResearch Pressurization System (Kit 60-5024)		August, 1981

NOTE: Supplements applicable to equipment other than that installed may, at the discretion of the owner/operator, be removed from the manual.

** Supplements marked with an asterisk will not be supplied with flight manuals sold through Authorized Beech Outlets due to their limited applicability. If a document is required for your airplane, please order the document through normal channels.*

BEECHCRAFT DUKE 60, A60 & B60 LANDPLANE

AIRPLANE FLIGHT MANUAL SUPPLEMENT

CONTINUOUS PRESSURE OPERATED SURFACE DEICE SYSTEM

The information in this document is FAA approved material which together with the FAA Approved Airplane Flight Manual must be in the airplane during all flight operations when equipped with a Continuous Pressure Operated Surface Deice System installed in accordance with Beech Aircraft Corporation FAA approved data.

I. LIMITATIONS

1. Airplanes equipped with only the Continuous Pressure Operated Surface Deice System are not approved for flight in known icing conditions. (Refer to Airplane Flight Manual Supplement, FLIGHT IN KNOWN ICING CONDITIONS, P/N 60-590001-17.)
2. Stall speeds are increased 4 knots in all configurations with surface deice system operating.
3. Instrument Markings:
   Pneumatic pressure gage: Green Arc 7 psi to 20 psi; Red Line at 20 psi.

II. PROCEDURES (Procedures outlined for safety of flight when icing is inadvertantly encountered).

1. BEFORE TAKE-OFF.
   a. Power - 2000 RPM.
   b. Deice Switch - ONE-CYCLE (UP).
   c. Pneumatic Pressure - 15 to 18 PSI (while boots are inflating).
   d. Wing Boots - CHECK VISUALLY FOR INFLATION AND HOLD DOWN.
2. IN FLIGHT

When ice accumulates 1/2 to 1 inch.

   a. Deice Switch: ONE-CYCLE (UP).
   b. Pneumatic Pressure - 15 to 18 PSI (while boots are inflating).
   c. Repeat - AS REQUIRED.

CAUTION

Rapid cycles in succession or cycling before at least 1/2 inch of ice has accumulated, may cause the ice to grow outside the contour of the inflated boots and prevent ice removal.

NOTE

Either engine will supply sufficient vacuum and pressure for deice operation.

III. EMERGENCY PROCEDURE.

1. Failure of ONE CYCLE Operation.
   a. Deice Switch - MANUAL (Do not hold more than 8 seconds)

CAUTION

The boots will inflate only as long as the switch is held in the MANUAL position. When the switch is released the boots will deflate.

2. Failure of boots to deflate.
   a. Pull circuit breaker on copilot's subpanel.

APPROVED: A.H. Schultz

for Chester A. Rembleske
Beech Aircraft Corporation
DOA CE-2

FAA Approved
Date: August 31, 1973
P/N 60-590001-11

BEECHCRAFT DUKE 60, A60 & B60 LANDPLANE

AIRPLANE FLIGHT MANUAL SUPPLEMENT

GOODRICH ELECTROTHERMAL PROPELLER DEICE SYSTEM

The information in this document is FAA approved material which together with the FAA Approved Airplane Flight Manual must be in the airplane during all flight operations when equipped with Goodrich Electrothermal Propeller Deice System installed in accordance with Beech Aircraft Corporation FAA approved data.

I. LIMITATIONS

1. Airplanes equipped with only the Electrothermal Propeller Deice System are not approved for flight in known icing conditions. (Refer to Airplane Flight Manual Supplement, FLIGHT IN KNOWN ICING CONDITIONS, P/N 60-590001-17).
2. Propeller Deice should not be operated when propellers are static.

II. NORMAL PROCEDURES (Procedures outlined for safety of flight when icing is inadvertently encountered).

1. BEFORE TAKEOFF
   a. Propeller Deice Switch - ON
   b. Deice Ammeter - 14 to 18 AMPERES
   c. To check the automatic timer, watch the deice ammeter closely for at least two minutes. A small momentary deflection approximately every 30 seconds (on serials prior to P-579) or 90 seconds (on serials P-579 and after) shows that the timer is switching and indicates normal system operation. Normal operating range is 14 to 18 amperes.
   d. Propeller Deice Switch - Off

2. IN FLIGHT
   a. Propeller Deice Switch - ON. The system may be operated continuously in flight and will function automatically until the switch is turned off.
   b. Relieve propeller imbalance due to ice by increasing rpm briefly and returning to the desired setting. Repeat as necessary.

III. EMERGENCY PROCEDURES

An abnormal reading on the Propeller Deice Ammeter indicates need for the following action:

1. Zero Amps.
   Check prop deice circuit breaker. If the circuit breaker has tripped, a wait of approximately 30 seconds is necessary before resetting. If ammeter reads 0 and the circuit breaker has not tripped or if the ammeter still reads 0 after the circuit breaker has been reset, turn the switch off and consider the prop deice system inoperative.
2. Zero to 14 Amps.
   If the prop deice system ammeter occasionally or regularly indicates less than 14 amps, operation of the prop deice system can continue unless serious propeller imbalance results from irregular ice throw-offs.
3. 18 to 23 Amps.
   If the prop deice system ammeter occasionally or regularly indicates 18 to 23 amps, operation of the prop deice system can continue unless serious imbalance results from irregular ice throw-offs.
4. More than 23 Amps.
   If the prop deice system ammeter occasionally or regularly indicates more than 23 amps, the system should not be operated unless the need for prop deicing is urgent.

Approved: Donald H Peters

For W.H. Schultz
Beech Aircraft Corporation
DOA CE-2

FAA Approved
Revised: June, 1981
P/N 60-590001-13

Raytheon Aircraft

Beech® Duke 60, A60 & B60 Landplanes

FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT

for

FLIGHT IN KNOWN ICING CONDITIONS

This Supplement is applicable to the following Manual(s):

60-590000-5 and 60-590000-11

Airplane Serial Number: _____

Airplane Registration Number: _____

FAA Approved by: _____
A.C. Jackson
Raytheon Aircraft Company
DOA CE-2

FAA Approved
Revised: September, 1998
P/N 60-590001-17

GENERAL

The information in this supplement is FAA-approved material which, together with the FAA Approved Airplane Flight Manual, must be in the airplane during all flight operations when the airplane has been certified as properly equipped for flight into icing conditions per Special Conditions issued to Beech Aircraft Corporation via Letter CE 213 dated 1 June 1967.

LIMITATIONS

1. Airplane must be equipped with the following items and all equipment listed must be operable:
   a. Wing and Empennage Continuous Pressure Operated Surface Deice System
   b. Goodrich Electrothermal Propeller Deice System
   c. Fuel Vent Heaters
   d. Heated Stall Warning (Goodrich 3E1793 or Safe Flight 190-1, 190-3, or 191-52)
   e. Pitot Heat
   f. Left Windshield Heat
   g. Antenna Mast capable of withstanding ice loads
   h. Windshield Defroster
   i. Wing Ice Lights
   j. FAA Approved Airplane Flight Manuals (P/N 60-590000-5E or 60-590000-11 with latest revision)
   k. FAA Approved Airplane Flight Manual Supplements
   P/N 60-590001-11 dated August 31, 1973 or later, Continuous Pressure Operated Surface Deice System
   P/N 60-590001-13 dated August 31, 1973 or later, Goodrich Electrothermal Propeller Deice System

2. When the above listed equipment is installed and operational, a placard will be placed on the Operation Limitation panel which states "THIS AIRPLANE IS APPROVED FOR FLIGHT IN KNOWN ICING CONDITIONS".
3. Minimum airspeed for sustained flight in icing conditions ..... 140 knots
4. Minimum ambient temperature for operation of deicing boots ..... -40°C
5. Sustained flight in icing conditions with flaps extended is prohibited except for approach and landings.

LIMITATIONS WHEN ENCOUNTERING SEVERE ICING CONDITIONS (Required By FAA AD 98-04-24)

WARNING

Severe icing may result from environmental conditions outside of those for which the airplane is certificated. Flight in freezing rain, freezing drizzle, or mixed icing conditions (supercooled liquid water and ice crystals) may result in ice build-up on protected surfaces exceeding the capability of the ice protection system, or may result in ice forming aft of the protected surfaces. This ice may not be shed using the ice protection systems, and may seriously degrade the performance and controllability of the airplane.

1. During flight, severe icing conditions that exceed those for which the airplane is certificated shall be determined by the following visual cues. If one or more of these visual cues exists, immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the icing conditions.
   a. Unusually extensive ice accumulation on the airframe and windshield in areas not normally observed to collect ice.
   b. Accumulation of ice on the upper surface of the wing, aft of the protected area.
   c. Accumulation of ice on the engine nacelles and propeller spinners farther aft than normally observed.
2. Since the autopilot, when installed and operating, may mask tactile cues that indicate adverse changes in handling characteristics, use of the autopilot is prohibited when any of the visual cues specified above exist, or when unusual lateral trim requirements or autopilot trim warnings are encountered while the airplane is in icing conditions.
3. All wing icing inspection lights must be operative prior to flight into known or forecast icing conditions at night. [NOTE: This supersedes any relief provided by the Master Minimum Equipment List (MMEL).]

NORMAL PROCEDURES

This airplane is approved for flight in icing conditions when the equipment listed in the Limitations Section of this supplement is installed and operational. This approval is based on tests conducted in natural and simulated icing conditions. These conditions do not include, nor were tests conducted in, all icing conditions that may be encountered (e.g., freezing rain, freezing drizzle, mixed conditions, or conditions defined as severe). Such icing conditions have the potential of producing hazardous ice accumulations, which: 1) exceed the capabilities of the airplane's ice protection equipment; and/or 2) create unacceptable airplane performance. Flight into icing conditions which lie outside those tested is not prohibited; however, pilots must be prepared to divert the flight promptly if hazardous ice accumulations occur.

BEFORE TAKEOFF

1. Surface Deice System - CHECK
   a. Power - 2000 RPM
   b. Deice Switch - ONE-CYCLE (UP)
   c. Pneumatic Pressure - 15 to 18 PSI
   d. Wing Boots - CHECK VISUALLY FOR INFLATION AND HOLD-DOWN.
2. Electrothermal Propeller Deice - CHECK
   a. PROP HT Switch - ON
   b. PROP AMP Indicator - CHECK 14 or 18 AMPERES
   c. Automatic Timer - CHECK PROPELLER AMMETER FOR TWO MINUTES. Needle deflection every 30 seconds (serials prior to P-579) or 90 seconds (serials P-579 and after) indicates normal operation.
3. Fuel Vent Heat
   a. Left Switch - ON
   b. Right Switch - ON

NOTE

Switches should remain ON throughout operation.

4. Pitot Heat and Heated Stall Warning
   a. Left Pitot Heat Switch - ON (Note deflection on loadmeter.)
   b. Right Pitot Heat and Stall Warning Switch - ON (Note deflection on loadmeter.) (Stall warning heat is reduced or disconnected by a landing gear switch to protect against overheat during ground operation.)

NOTE

Switches may be left on throughout flight. Prolonged operation on the ground could damage the Pitot Heat System.

5. Left Windshield Heat - CHECK:

FOR AIRPLANES WITH WINDSHIELD HEAT INVERTER VOLTMETER

a. Propellers - 1200 to 1500 RPM

b. Both Generators - ON

c. WSHLD HT Switch - ON

CAUTION

On airplanes prior to P-556, the inverter voltmeter should indicate in the green band (220 to 260). Indication outside of the green band indicates insufficient windshield heat. On airplanes P-556 and after, voltmeter indication will be cyclic. The voltmeter should indicate in the green band until the heated section reaches approximately 110°F, at which time the voltmeter will drop to 0. When the heated section cools to approximately 90°F the inverter will reactivate and the voltmeter will indicate in the green band. Indications above 0 but outside the green band indicate insufficient windshield heat.

d. Windshield - CHECK (Feel for warming)

NOTE

WSHLD HT switch may be left on for flight operation.

FOR AIRPLANES WITHOUT WINDSHIELD HEAT INVERTER VOLTMETER

e. Propeller - 1200 TO 1500 RPM

f. One Generator (left or right) - OFF

g. WSHLD HT Switch - ON (Note increase on operative loadmeter - minimum of .20 units)

CAUTION

Loadmeter increase of less than .20 units indicates insufficient windshield heat.

h. Windshield - CHECK (Feel for warming)

NOTE

WSHLD HT switch may be left on for flight operation.

i. Both Generators - ON

6. Defrost Air - CHECK OPERATION

7. Wing Ice Lights - CHECK

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WARNING

Due to distortion of the wing airfoil, ice accumulations on the leading edges can cause a significant loss in rate of climb and in speed performance, as well as increases in stall speed. Even after cycling the deicing boots, the ice accumulation remaining on the boots and unprotected areas of the airplane can cause large performance losses. For the same reason, the aural stall warning system may not be accurate and should not be relied upon. Maintain a comfortable margin of airspeed above the normal stall airspeed. In order to minimize ice accumulation on unprotected surfaces of the wing, maintain a minimum of 140 knots during operations in sustained icing conditions. Prior to a landing approach, cycle the deicing boots to shed any accumulated ice.

1. Surface Deice System

When ice accumulates 1/2 to 1 inch:

a. Deice Switch - ONE CYCLE (UP)

b. Pneumatic Pressure Gage - CHECK 15 - 18 PSI (while system is on pressure cycle).

c. Repeat as required.

CAUTION

Rapid cycles in succession, or cycling before at least 1/2 inch of ice has accumulated, may cause the ice to grow outside the contour of the inflated boots and prevent ice removal.

NOTE

Either engine will supply sufficient vacuum and pressure for deice operation.

NOTE

Failure of ONE-CYCLE function can be overcome by use of the MANUAL switch.

2. Electrothermal Propeller Deice

a. PROP HT Switch - ON

NOTE

Systems may be operated continuously in flight. Relieve propeller imbalance by increasing rpm. If PROP AMPS reads above 18 amperes or below 14 amperes, refer to Emergency Procedures in this supplement.

3. Fuel Vent Heat

a. Left and right switches ON before takeoff. Continuous operation is recommended.

4. Left and Right Pitot Heat (Heated Stall Warning Switch combined with or in place of Right Pitot Switch) - Switches ON

a. May be turned on before takeoff. System may be operated continuously in flight. Check both switches ON when encountering visible moisture.

CAUTION

Prolonged use of Pitot Heat on the ground will damage the heating elements.

5. Heated Windshield
   a. WSHLD HT Switch(es) - ON AS REQUIRED (Heat should be applied before ice forms.)

CAUTION

The electrically heated windshield should be turned off for a 15-second period to allow the pilot to take a reading on the standby compass for the purpose of resetting the directional gyro.

Ground use of windshield heat is limited to 10 minutes.

6. Defrost Air
   a. Defrost Air - PULL ON (Before entering icing condition)

NOTE

For maximum windshield defrosting, PULL OFF pilot and copilot air and place vent blower switch in HI position.

7. Wing Ice Light
   a. Use wing ice light as required.

EMERGENCY PROCEDURES

1. Surface Deice System
   a. Failure of ONE-CYCLE Operation - HOLD TO MANUAL (8 seconds maximum).
   b. Failure of Boots to Deflate - PULL SURF SYS CIRCUIT BREAKER IN COPILOT'S SUB-PANEL.
2. Electrothermal Propeller Deice Abnormal Ammeter Reading
   a. Zero Amps.
   Check prop deice circuit breaker. If the circuit breaker has tripped, a wait of approximately 30 seconds is necessary before resetting. If ammeter reads 0 and the circuit breaker has not tripped or if the ammeter still reads 0 after the circuit breaker has been reset, turn the switch off and consider the prop deice system inoperative.
   b. Zero to 14 amps.
   If the prop deice system ammeter occasionally or regularly indicates less than 14 amps, operation of the prop deice system can continue unless serious propeller imbalance results from irregular ice throw-offs.
   c. 18 to 23 Amps.
   If the prop deice system ammeter occasionally or regularly indicates 18 to 23 amps, operation of the prop deice system can continue unless serious imbalance results from irregular ice throw-offs.
   d. More than 23 Amps.
   If the prop deice system ammeter occasionally or regularly indicates more than 23 amps, the system should not be operated unless the need for prop deicing is urgent.

SEVERE ICING CONDITIONS
(Alternate Method Of Compliance With FAA AD 98-04-24)

THE FOLLOWING WEATHER CONDITIONS MAY BE CONDUCIVE TO SEVERE IN-FLIGHT ICING:

- Visible rain at temperatures below 0 degrees Celsius ambient air temperature.
- Droplets that splash or splatter on impact at temperatures below 0 degrees Celsius ambient air temperature.

PROCEDURES FOR EXITING THE SEVERE ICING ENVIRONMENT:

These procedures are applicable to all flight phases from takeoff to landing. Monitor the ambient air temperature. While severe icing may form at temperatures as cold as -18 degrees Celsius, increased vigilance is warranted at temperatures around freezing with visible moisture present. If the visual cues specified in the Limitations Section for identifying severe icing conditions are observed, accomplish the following:

1. Immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the severe icing conditions in order to avoid extended exposure to flight conditions more severe than those for which the airplane has been certificated.
2. Avoid abrupt and excessive maneuvering that may exacerbate control difficulties.
3. Do not engage the autopilot.
4. If the autopilot is engaged, hold the control wheel firmly and disengage the autopilot.
5. If an unusual roll response or uncommanded roll control movement is observed, reduce the angle-of-attack.
6. Do not extend flaps when holding in icing conditions. Operation with flaps extended can result in a reduced wing angle-of-attack with the possibility of ice forming on the upper surface further aft on the wing than normal, possibly aft of the protected area.
7. If the flaps are extended, do not retract them until the airframe is clear of ice.
8. Report these weather conditions to Air Traffic Control.

PERFORMANCE

No Change

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BEECHCRAFT DUKE 60, A60 & B60 LANDPLANE

AIRPLANE FLIGHT MANUAL SUPPLEMENT

for the

WOODWARD ELECTRONIC PROPELLER SYNCHRONIZER

The information in this document is FAA Approved material which, together with the basic airplane flight manual is applicable and must be attached to the basic manual when the airplane is modified by the installation of the Woodward Electronic Propeller Synchronizer in accordance with STC SA250CE.

The information in this document supersedes the basic manual only where covered in the items contained herein. For Limitations, Procedures, and Performance not contained in the supplement, consult the basic Airplane Flight Manual.

I. LIMITATIONS

The following placard must be mounted on or near the synchronizer control switch:

"PROP SYNCH MUST BE OFF FOR TAKEOFF AND LANDING"

II. NORMAL PROCEDURES

1. Synchronize the engines manually.
2. Position control switch to ON position.
3. If a change in rpm setting is desired, move both master (right) and slave propeller governor control levers together.
4. If synchronization is not maintained with the switch ON, indicating the actuator has reached the end of its travel, turn switch OFF and repeat procedures above. With the switch in the OFF position, the actuator is returned to the center of its travel.

III. PERFORMANCE

No change in airplane performance results from the installation of the synchronizer.

IV. FUNCTIONAL TEST

The rpm range of the synchronizer may be checked in cruise by slowly moving only the master propeller control toward both high and low rpm until propellers are no longer synchronized.

Note the range of rpm over which the slave engine remains synchronized with the master engine. This is the limited range provided for safety and is the maximum speed adjustment range beyond which the slave engine cannot be adjusted by the synchronizer.

Approved:

for Chester A. Rembleske
Beech Aircraft Corporation
DOA CE-2

FAA Approved
Date: August 31, 1973
P/N 60-590001-19

BEECHCRAFT LANDPLANES, DUKE 60, A60 and B60

AIRPLANE FLIGHT MANUAL SUPPLEMENT

KING KNC-610 AREA NAVIGATION SYSTEM
and
KING KN-74 AREA NAVIGATION SYSTEM

GENERAL

This document is to be attached to the FAA Approved Airplane Flight Manual when the airplane is equipped with a King KNC-610 Area Navigation System or King KN-74 Area Navigation System which has been installed in accordance with BEECHCRAFT FAA approved data.

The information in this document supersedes the basic FAA Approved Airplane Flight Manual only where covered in the items contained herein.

LIMITATIONS

1. This system shall not be used as a primary system under IFR conditions except on approved approach procedures, approved area navigation airways, and random area navigation routes when approved by Air Traffic Control.

2. This system is to be used only with colocated facilities (VOR and DME signals originate from the same geographical location).

EMERGENCY PROCEDURES

CAUTION

DME may unlock due to loss of signal with certain combinations of distance from station, altitude, and angle of bank.

1. VOR or DISTANCE flag appears while in RNAV mode:

   a. Selected Frequency - CHECK FOR CORRECT FREQUENCY
   b. VOR or DISTANCE flag intermittent or lost - UTILIZE OTHER NAVIGATION EQUIPMENT AS REQUIRED.

2. VOR or DISTANCE flag appears while in APPR mode:

   a. If flag appears while on an approach, execute a missed approach and utilize another approved facility.

NORMAL PROCEDURES

1. VHF NAV - ON
2. DME - ON
3. Mode Selector - SELECT VOR/DME, RNAV, or APPR
4. NAV Frequency - SET
5. DME Frequency - SET
6. Waypoint Bearing - SET WAYPOINT RADIAL FROM VORTAC
7. Waypoint Distance - SET WAYPOINT DISTANCE FROM VORTAC
8. OBS Control - DESIRED MAGNETIC COURSE
9. Self-Test - ACTUATE (must have VOR reception)

PERFORMANCE - No change

Approved: A. A. Schmitz
for Chester A. Rembleske
Beech Aircraft Corporation
DOA CE-2

FAA Approved
Date: August 15, 1975
P/N 60-590001-21

BEECHCRAFT DUKE B60 LANDPLANE

AIRPLANE FLIGHT MANUAL SUPPLEMENT
for the
BEECHCRAFT H-14 AUTOPILOT

The information in this document is FAA Approved material which, together with the appropriate basic FAA approved placarding, is applicable and must be carried in the aircraft when it is modified by the installation of a BEECHCRAFT H-14 Autopilot, alone or in combination with Altitude Hold, ILS Coupler, or Automatic Trim.

The information in this document supersedes the basic placarding only where covered in the items contained in this manual. For limitations and procedures not contained in this manual, consult the basic placarding.

I. LIMITATIONS

A. Disengage autopilot before take-off.

B. Do not use autopilot under 200 feet above terrain.

C. In case of engine failure during an ILS approach, disengage autopilot.

D. Approach localizer at an angle of 70° or less with the approach coupler operating.

E. Disengage NAV switch during VOR or R-NAV approaches.

II. OPERATING PROCEDURES

A. NORMAL OPERATING PROCEDURES.

1. Starting.

   The autopilot may be turned on any time after the aircraft engines have been started. Since the equipment is transistorized, no warm-up is required. However, make certain that the gyros are erect and stable prior to engaging the system. Electrical power to the autopilot can be interrupted by pulling the autopilot circuit breaker.

2. Preflight Check.

   a. Check to see that the gyro pressure supply is indicating between 3.5 and 5.5 inches of mercury. Make sure that both gyros are erect and stable.

   b. Move the Turn Control to the right. The aileron control wheel should move to the right to full autopilot deflection. This is somewhat less than full aileron.

   c. Move the Turn Control to the left of center. The control wheel should move an equal amount to the left side. Intermediate positions of the ailerons are difficult to obtain during ground check, as there is no balancing signal on the servos or control surfaces.

   d. Disengage the autopilot and re-engage with the elevator control column in the center of travel. Hold a light back pressure to counteract the weight of the elevator. Rotate the autopilot Pitch Control wheel forward. The control column should move forward. The auto trim system should cause the elevator trim indicator to move in a down direction (same direction of movement as the autopilot pitch control wheel). Rotate the autopilot Pitch Control wheel aft. The control column should move aft. The auto trim system should cause the elevator trim indicator to move in an up direction (same direction of movement as the autopilot pitch control wheel).

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e. Engage the Altitude Switch by pushing it in. It should remain in. Move the pitch control wheel. The altitude switch should pop out.

f. When an ILS frequency can be received, engage the ILS (with the Altitude Switch on, the Turn Control in the detent position, and the D.G. uncaged). The altitude switch may drop out depending on the glideslope needle position. The aileron control will move in the direction of the ILS needle. Move the Turn Control out of the detent; the ILS switch should drop to the OFF position.

g. With the Turn Control in the detent position, and the directional gyro uncaged, manually turn the aircraft to the left (smaller heading). The aileron control wheel should move to the right. Turning the airplane to the right of the engaged heading should cause the aileron control wheel to move to the left. This check is usually performed while taxiing.

h. Disengage the autopilot. All controls should be free through full travel. Reset manual trim for take-off position.

WARNING

After disengaging autopilot, RECHECK AIRCRAFT PITCH TRIM PRIOR TO TAKE-OFF.

3. In-Flight Operation.

The autopilot may be engaged above 200 feet after take-off. First manually trim the airplane (this is not critical and manual trimming may be done on all axes while the autopilot is engaged). Place the turn control in the center detent position. Press the autopilot engage switch in. The switch should remain engaged. Disengage the autopilot by pressing the switch to OFF or pressing the autopilot disconnect button on the pilot's control wheel. If the autopilot is engaged with the Turn Control out of detent, the aircraft will assume a bank angle proportional to the position of the Turn Control.

The yaw damper activates when the autopilot is turned on, but the yaw damper may be turned on separately while the autopilot is off by pushing in the YAW DAMPER button to the right of the autopilot ON-OFF switch.

a. Maneuvering In Flight.
With the autopilot engaged, the aircraft may be maneuvered through ±22° of pitch with the Pitch Control wheel and 30° left and right bank angles with the Turn Control. The rudder is automatically coordinated during all turns, and yaw dampening is included any time the autopilot is engaged. There is no minimum airspeed restriction for operation of the autopilot. Gear and flap operation plus change of airspeed may be performed normally with the autopilot engaged. If automatic pitch trim is not included in this system, manually retrim the elevator for flight condition changes by centering the pitch trim indicator. Trim to the direction opposite the needle indication. The rudder axis may be trimmed to center the ball at any time during autopilot operation.

b. Heading Operation.
The autopilot is electrically connected to the directional gyro for heading control whenever this gyro is engaged and the Turn Control is in the center (detent) position. The heading control is automatically disengaged when the Turn Control is used to bank the aircraft and automatically re-engages three (3) seconds after the Turn Control is returned to the center (detent) position.

c. Altitude Control Operation.
The altitude control may be engaged by pressing the ON portion of the altitude switch. It is automatically disengaged whenever a pitch signal is applied through the

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P/N 60-590001-33

Pitch Control wheel or directly by pressing the OFF portion of the altitude switch. The aircraft will hold the pressure altitude existing at the time the switch is depressed. For best operation, engage the altitude control in level flight. If the altitude switch is engaged in a normal climb or dive, the aircraft will level off slightly beyond the selected altitude. When the altitude switch is disengaged, the aircraft will assume the climb or dive attitude existing at the time that the altitude switch was depressed.

d. ILS Coupler Operation.
The ILS coupler receives information from the radio ILS receivers to follow the localizer and glidepath. The proper ILS frequency must be tuned in and the OFF warning flags must be out of sight before using the ILS coupler. Let down, orientation, and procedure turn (approach at 70° or less to the beam heading) may be performed with the autopilot. Engage the altitude switch when the authorized altitude for the procedure turn is reached. Engage the ILS switch when the ILS localizer needle is one-half the distance from full deflection and is moving toward center. Air speed during localizer intercept shall not exceed 140 knots. The aircraft will automatically bracket the beam. When the aircraft intercepts the glideshope, the altitude switch will automatically disengage and the glideslope coupler will provide the proper pitch control to hold the aircraft on the glidepath. Airspeed during the descent is controlled by the throttles. In case of a missed approach, disengage the ILS coupler by moving the Turn Control out of the detent, or by pressing the OFF portion of the ILS switch.

NOTE

In the event the glide path of the ILS System is inoperative, or a glidepath receiver is not included in the aircraft's radio equipment, fly the altitude and glide path with the Pitch Control Wheel.

B. EMERGENCY PROCEDURES.

1. Maximum altitude losses during malfunction tests were:

CONFIGURATION	ALTITUDE LOSS
Climb	100 ft.
Cruise	150 ft.
Descent	500 ft.
Approach/ILS Coupler	50 ft.
Single Engine Approach/ILS Coupler	80 ft.

2. Overpower forces at the pilot's controls are as follows:

CONTROL	OVERPOWER FORCE
Aileron	22 lbs.
Elevator	33 lbs.
Rudder	50 lbs.

3. If failure of either engine is experienced during level flight, disengage autopilot, manually trim, and re-engage autopilot.

CAUTION

In case of an engine failure during an ILS approach, disengage the autopilot and continue approach manually.

4. For normal operation - Pressure from **either** engine is sufficient to operate the autopilot and the instruments.

Approved: R. H. Schultz

for **Chester A. Rembleske**
Beech Aircraft Corporation
DOA CE-2

FAA Approved
Date: August 31, 1973
P/N 60-590001-33

BEECHCRAFT DUKE B60 LANDPLANES

AIRPLANE FLIGHT MANUAL SUPPLEMENT
for
DUKE B60 REDUCED POWER PROCEDURES
FOR CERTIFICATION IN SWITZERLAND, GERMANY, AND AUSTRIA

GENERAL

This document is applicable to the Duke B60 (P-247 thru P-522) when certified in Switzerland and Austria and Duke B60 (P-247 and after) when certified in Germany and must be attached to the FAA Approved Flight Manual. This is to outline changes in airplane limitations and procedures required for certification in these countries.

In order to meet the noise level requirements for operation of the Duke B60 in Switzerland, Germany, and Austria, all two-engine operations except take-off must be conducted with 2750 RPM and 35.5 in. Hg, maximum. This Supplement provides FAA Approved performance information for reduced-power two-engine climb.

ENGINE OPERATING LIMITS

Take-Off and Single Engine Operation ..... 41.5 in. Hg and 2900 RPM, 380 BHP

Maximum Two Engine Climb Power ..... 35.5 in. Hg and 2750 RPM, 323 BHP

INSTRUMENT MARKINGS

Manifold Pressure

Normal Operating Range (Green Arc) ..... 14 - 35.5 in. Hg
Take-Off and Single Engine Operation (Yellow Arc) ..... 35.5 - 41.0 in. Hg
Maximum (Red Radial) ..... 41.5 in. Hg

Tachometer

Normal Operation (Green Arc) ..... 2350 - 2750 rpm
Take-Off and Single Engine Operation (Yellow Arc) ..... 2750 - 2900 rpm
Maximum (Red Radial) ..... 2900 rpm

REDUCED POWER OPERATION

Time Limitation - Use take-off power until stabilized climb configuration is established

Maximum Two-Engine Climb Power Graph ..... page 2 of 3

EMERGENCY OPERATION

In event of engine failure during two engine climb, fully advance propeller control levers and throttles, then feather propeller of the inoperative engine.

Single Engine Climb Graph ..... page 3 of 3

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DOA CE-2

FAA Approved
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MAXIMUM TWO-ENGINE CLIMB POWER

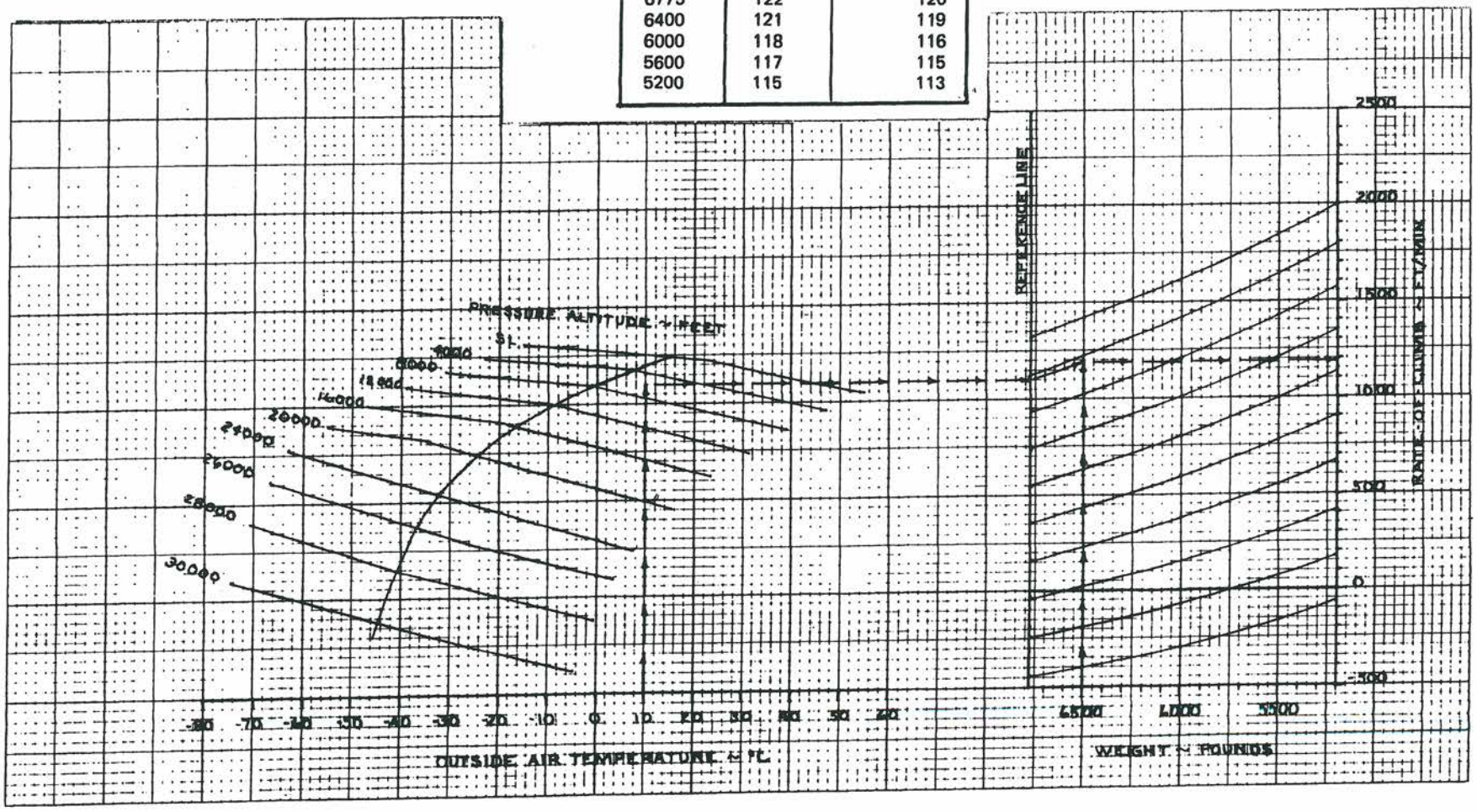
ASSOCIATED CONDITIONS:

POWER	2750 RPM & 35.5 IN.HG M.P. OR FULL THROTTLE
GEAR	UP
FLAPS	UP
COWL FLAPS	OPEN
CLIMB SPEED	IAS AS TABULATED

WEIGHT POUNDS	CLIMB SPEED ~ KNOTS	
	CAS	IAS (ASSUMES 0 INST. ERROR)
6775	122	120
6400	121	119
6000	118	116
5600	117	115
5200	115	113

EXAMPLE:

OAT	10°C
PRESS. ALT.	6000 FT
WEIGHT	6500 LBS
RATE-OF-CLIMB	1190 FT/MIN
CLIMB SPEED	119 KIAS



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SINGLE-ENGINE CLIMB

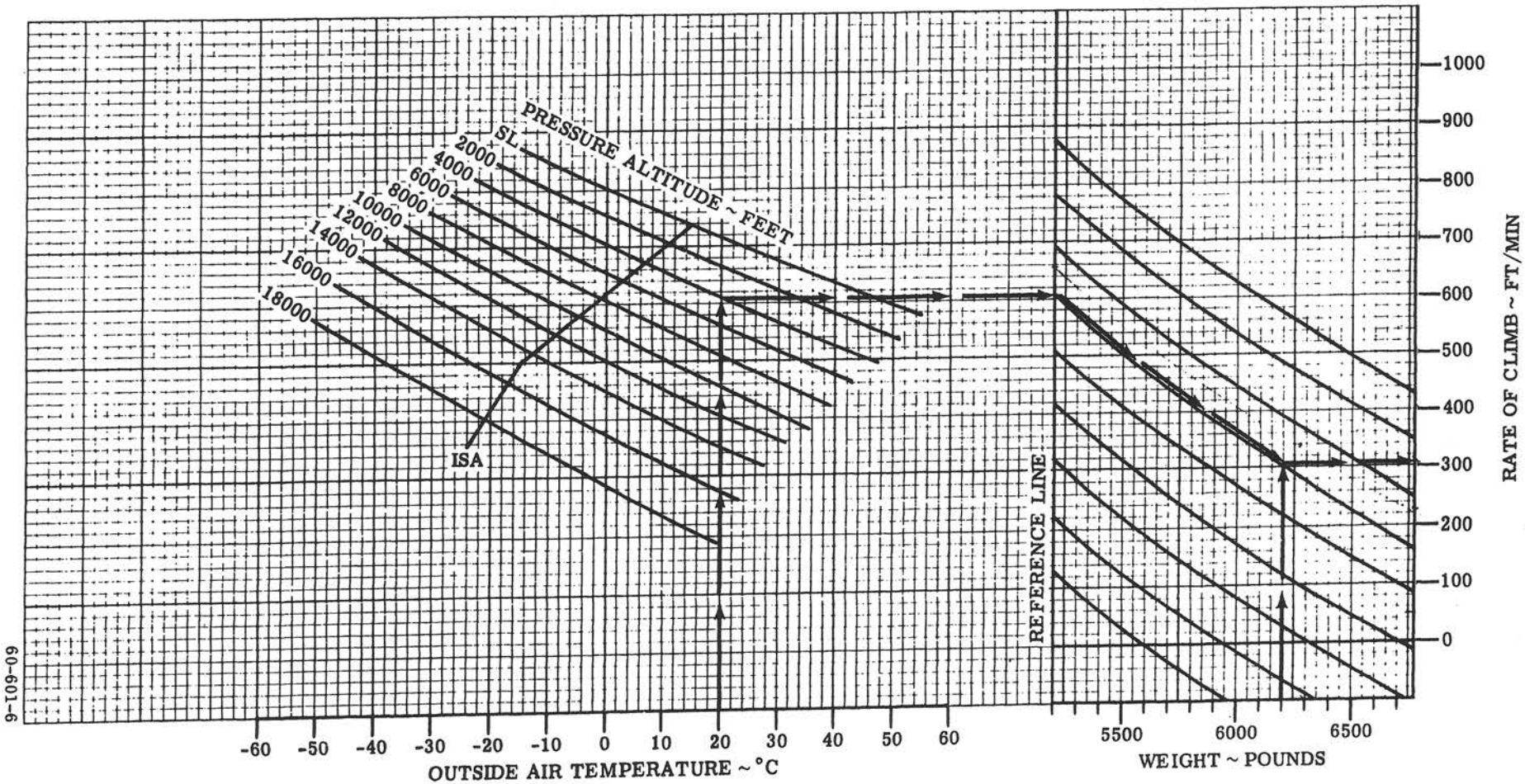
ASSOCIATED CONDITIONS:

POWER	41 IN. HG, 2900 RPM
GEAR	UP
FLAPS	UP
COWL FLAPS	OPEN
INOPERATIVE PROPELLER	FEATHERED
CLIMB SPEED	IAS AS TABULATED

WEIGHT POUNDS	CLIMB SPEED ~ KNOTS	
	CAS	IAS (ASSUMES ZERO INST. ERROR)
6775	112	110
6400	110	108
6000	108	106
5600	106	104
5200	105	103

EXAMPLE:

OAT	20°C
PRESSURE ALTITUDE	4000 FT
WEIGHT	6200 LBS
RATE OF CLIMB	305 FT/MIN
CLIMB SPEED	107 KIAS



BEECHCRAFT DUKE B60 LANDPLANE

AIRPLANE FLIGHT MANUAL SUPPLEMENT

for the

COLLINS ANS-31 AREA NAVIGATION SYSTEM
or
COLLINS NCS-31 NAVIGATION CONTROL SYSTEM

GENERAL

The information in this supplement is FAA Approved material which along with the basic Duke B60 FAA Approved Airplane Flight Manual is applicable to the operation of the airplane when modified by the installation of the Collins ANS-31 Area Navigation System or the Collins NCS-31 Navigation Control System installed in accordance with Beechcraft Approved Data. The information in this supplement supersedes or adds to that of the basic airplane flight manual. Users of this manual are advised always to refer to the supplement for possible superseding information and placarding applicable to operation of this airplane.

LIMITATIONS

1. The Area Navigation mode may not be used as a primary system under IFR conditions except on approved approach procedures, approved airways, and random area navigation routes when approved by Air Traffic Control.

2. The Area Navigation mode can only be used with colocated facilities. (VOR and DME signals originate from same geographical location.)

EMERGENCY PROCEDURES

CAUTION

DME may unlock due to loss of signal with certain combinations of distance from station, altitude and angle of bank.

1. If NAV flag appears while in the enroute mode, check for correct frequency.

2. If VOR or DME equipment is intermittent or lost, utilize other navigation equipment as required.

3. If NAV flag appears during an approach, execute published missed approach and utilize another approved facility.

NORMAL PROCEDURES

The Collins ANS-31/NCS-31 Systems are push-button operated navigation computers with ten waypoint memory capacities. They contain a numerical keyboard for data entry and digital displays for data readout. Included is the capability to tune the VOR/DME, localizer and glideslope receivers, and electronically "move" the VOR to a phantom location called a waypoint. A waypoint is a convenient navigational position either at or within reception range of a selected VOR/DME station. The position of the waypoint is a function of its bearing and distance from the station.

In addition to the navigation function, the NCS-31 system can provide for the frequency control of two VHF communications radios, two ADF radios, two ATC transponders, and a second VOR and DME radio. Refer to the appropriate Collins manual for specific operating instructions of this feature.

The ANS-31/NCS-31 systems operate in three fundamental modes: VOR, localizer/glideslope, and Area Navigation. In the VOR mode, the units operate as conventional VOR converters with an "angular course deviation" scale factor of ±10 degrees presented on the Horizontal Situation Indicator. The localizer/glideslope mode presents data in a conventional display with an "angular course deviation" scale factor appropriate to the specific approach facility.

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For Area Navigation, course deviation is presented in nautical miles on the Horizontal Situation Indicator rather than in degrees as with the VOR mode. This feature, referred to as "linear course deviation", provides for a constant course width irrespective of the distance to the waypoint. Two levels of sensitivity are available in the Area Navigation mode. They are designated ENROUTE and APPROACH for use in enroute and terminal/approach navigation. The ENROUTE sensitivity, available when the flight control system is not in the approach mode, provides a constant course width of ±10 nautical miles. APPROACH sensitivity, available when the flight control system is in the approach mode, provides a constant course width of ±2 nautical miles. APPROACH sensitivity should be used when within ten nautical miles of the terminal waypoint.

DISPLAYS AND CONTROLS

The ANS-31/NCS-31 systems are programmed and operated from a panel mounted control unit. Information such as waypoint number, station frequency, station elevation, waypoint bearing, and waypoint distance are entered into memory from the keyboard on the control unit. During the flight, the desired waypoints are recalled from memory and the modes of operation are selected on the control unit.

1. WPT Window:

   Identifies the waypoint defined by the displayed data. The letter "P" precedes the waypoint number when the displayed waypoint/frequency/code data is inactive/preset. The "P" blinks when the displayed data is on the scratch pad only.

2. FREQ Window:

   Displays the programmed VOR/DME/localizer frequency (108.00 through 117.95).

3. EL 100' Window:

   a. Displays the programmed VOR/DME station elevation in hundreds of feet.

   b. Displays the VOR-only mode of operation (VOR).

   c. Displays the localizer mode of operation (LOC).

4. BRG Window:

   a. Displays the waypoint bearing from the VOR/DME station (000.0° through 359.9°).

   b. Displays the localizer bearing in the LOC mode (000° through 359°).

   c. Displays the held VOR/DME frequency when DME HOLD is in use.

5. DIST Window:

   a. Displays the waypoint distance from the VOR/DME station (000.0 through 249.9 nautical miles).

   b. Annunciates DME HOLD is in use (dh).

6. TEST Button:

   Momentary push button to initiate ANS-31/NCS-31 self-test.

7. Data Keyboard:

   Ten digital (0 through 9) momentary keys for entry of numerical data.

8. CLR Key:

   Momentary key to clear scratch pad for correction of entry errors or revision of stored data.

FAA Approved
Issued: October 24, 1975
P/N 60-590001-39

9. PRE Key:

   Momentary key to store data displayed on scratch pad into memory.

10. WPT Key:

    Momentary key to display active waypoint data on the scratch pad. When used in conjunction with a digital key, the WPT key recalls the desired waypoint data from memory to the scratch pad.

11. USE Key:

    Momentary key to transfer displayed data on the scratch pad to the navigation computer and the VOR/DME/localizer receivers. Annunciates active data by blanking the display for 1/2 second before displaying active data.

NOTE

NAV/DME TEST and DME HOLD keys are located on the panel mounted control unit (ANS-31) or the mode select unit (NCS-31). The momentary NAV/DME TEST key only serves to initiate the VOR and DME receivers self-test. The particular system under test should be monitored for proper test indications. These tests will not affect the ANS-31/NCS-31 operation provided the key is not depressed for more than 8 seconds in the enroute mode, or more than 1 second in the approach mode. The DME HOLD key is an on-off pushbutton to hold the DME frequency.

A second panel-mounted component, the remote readout unit, displays the active navigation information in use. Distance or time to the waypoint, waypoint number, computed ground speed, waypoint passage alert, and various navigational modes are displayed on this unit.

1. MILES/MIN Window:
   Displays either the distance or time to or from the waypoint as selected by the MILES/MIN toggle switch.

2. WPT Window:
   a. Displays the active waypoint number in use.

   b. Displays the active VOR/DME frequency when DME HOLD is in use.

3. KTS Window:
   a. Displays the computed ground speed.

   b. Annunciates that the VOR-only mode of operation is in use (VOR).

   c. Annunciates that the localizer mode of operation is in use (LOC).

   d. Annunciates that the computer is in dead reckoning mode of operation (d-r).

   e. Annunciates that the DME HOLD is in use (dh).

4. ALERT Light:
   a. Indicates approach of waypoint (steady light).

   b. Indicates crossing the TO/FROM line (flashing light).

   c. Indicates recovery of valid VOR/DME signal after a prolonged loss in the dead reckoning, enroute mode (flashing light).

MEMORY FUNCTION

The status of the ANS-31/NCS-31 computer memory is annunciated on the upper scratch pad display of the control unit when avionic power is applied. If the memory has been erased, as would normally be the case when avionic power was last removed, the letters "POC" appear in the WPT and EL 100' display windows.

Actuation of the remote memory switch prior to removing avionic power will hold the programmed data in the computer memory. Subsequent reapplication of avionic power will confirm the program has been saved by showing the letters "POC" only in the WPT display window. The memory save function permits the computer to be programmed in advance of the flight and held in storage without the airplane's main electrical system activated. A small light adjacent to the memory switch indicates the memory function has been selected.

PREFLIGHT

SELF-TEST

This abbreviated self-test prescribes a procedure to check the ANS-31/NCS-31 prior to flight. Complete self-test procedures for maintenance checks are available in the system maintenance section (523-0765313/523-0765291) of the Collins ANS-31/NCS-31 Navigation Control System Instruction Manual (523-0765309/523-0765286). Abbreviated self-test procedures without fault isolation are available in the Collins ANS-31/NCS-31 Self-Test Guide (523-0765453/523-0765454).

1. Press the TEST button once on the control unit. The figure "8" will appear in all positions of the upper scratch pad.

2. Press the TEST button the second time. The figure "8" will extinguish from all positions and the figure "2" will appear in the WPT display. All other positions will be blank.

3. Press the TEST button the third time.

   a. Press the USE button, the numeral "1" key, and the numeral "8" key. The figure "8" will again appear in all positions of the upper scratch pad.

   b. Press the USE button, the numeral "2" key, and the numeral "8" key. The figure "8" will appear in all positions of the lower scratch pad.

   c. Press the USE button, the numeral "3" key, and the numeral "8" key. The figure "8" will appear in all positions (except position 5) of the remote readout unit.

4. Press the CLR key to exit the self-test program.

CAUTION

Engaging the ANS-31/NCS-31 self-test in flight may disrupt navigation calculations.

AREA NAVIGATION FUNCTIONAL TEST

The following procedure applies only to airports equipped with, or in range of, a colocated VOR/DME station.

1. Place the MILES/MIN switch on the remote readout unit in the MILES position.

2. Press WPT key.

3. Press any number key.

4. Enter the local VOR/DME station frequency and elevation.

5. Press USE key.

6. Adjust the course control knob on the Horizontal Situation Indicator to center the deviation bar.

7. The course arrow on the Horizontal Situation Indicator will point to the local station and the remote readout unit will display the distance.

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PROGRAMMING

Pertinent information (waypoint number, station frequency, station elevation, waypoint bearing, and waypoint distance) for up to ten waypoints is entered into memory from the control unit. Programming the computer may be completed prior to take-off or during the flight. Any combination of navigational facilities (RNAV waypoint, VOR/DME, ILS) may be loaded into the computer; however, it is desirable that each facility be numbered and loaded in the sequence it is to be used.

RNAV WAYPOINTS

1. Press the WPT key. One of two display conditions will occur on the control unit.

   a. The display will be blank, indicating the absence of an active waypoint. This is a normal display when loading the initial waypoint parameters.

   b. Active waypoint data will appear on the display.

2. Select the first waypoint by pressing the keyboard number "1" key.

   a. If the waypoint has not been previously stored in the memory, only the letter "P" and the waypoint number "1" will appear on the display.

   b. If the selected waypoint has been preset, the letter "P", the waypoint number, and the waypoint parameters will appear on the display.

3. Select the VOR/DME frequency by pressing the keyboard number keys in the proper sequence. A total of five digits must be entered to complete the frequency input (i.e., frequency 113.8 entered as 113.80). Prior data is blanked when the first frequency digit is entered. The letter "P" will blink as long as data displayed is on the scratch pad only (not stored in memory).

   Entries beyond the allowable range of navigational frequencies (108.00 through 117.95 MHz in .05 MHz increments) are annunciated immediately by the letters "CLR" appearing on the right edge of the scratch pad. Further entries are inhibited until the CLR key is pressed to erase the false digit.

4. Select the VOR/DME station elevation in hundreds of feet by pressing the keyboard number keys in the appropriate sequence. Two digits must be entered. Use a leading zero for elevations less than 1000 feet.

5. Successively press the keyboard number keys to select the waypoint bearing (radial) and waypoint distance from the station. All four digits must be entered, using leading zeros as required. Bearing and distance entries are not required when the waypoint is colocated with the VOR/DME station site.

   Entries beyond the allowable range of values for bearing (000.0° through 359.9°) and distance (000.0 through 249.9 nautical miles) are annunciated immediately by the letters "CLR" appearing on the right edge of the scratch pad. Further entries are inhibited until the CLR key is pressed to erase the false digit.

   NOTE

   If an error is noted during the programming, corrections or revisions of data within the allowable range of values can be made by pressing the CLR key. Data is erased by fields (FREQ, EL 100', BRG, and DIST) in the reverse order of entry each time CLR is pressed. Enter the correct data. Values for fields of correct data that were erased must be reentered.

6. Press the PRE key to place the displayed data into memory. This action will cause the display to go blank.

7. This completes the programming for the first waypoint. Follow these procedures for all selected waypoints up to a maximum of ten.

CONVENTIONAL VOR

The programming technique for conventional navigation directly toward or away from a VOR facility without a colocated DME is similar to that for RNAV waypoints. Inputing the waypoint number and frequency into the memory is accomplished in the same manner. Since the station has no DME, it cannot be electronically "moved" to a new location (waypoint). Therefore, no values are programmed in the EL 100', BRG or DIST displays. Only angular deviation on the Horizontal Situation Display is available in this mode.

ILS APPROACH (Front Course and Back Course)

Programming an ILS approach is accomplished in the same manner as programming conventional VOR. The control unit decodes the frequency as it is entered. Upon detecting that the frequency is in the ILS range, the letters "LOC" are annunciated immediately in the EL 100' display thereby inhibiting an elevation entry. Although not required for ILS operation, the localizer bearing (000° through 359°) may be programmed into the BRG display for convenient reference. Only angular deviation is provided in the ILS mode.

MISSED APPROACH

If the published missed approach utilizes an RNAV waypoint or VOR facility, it may be entered into memory any time prior to the approach. It is recommended that WPT "O" (keyboard numeral 0) be reserved for this operation. Any other waypoint storage (1 thru 9) could be used; however, habitual use of WPT "O" eliminates the possibility of error that could be experienced when selecting an intermediate digit during this critical flight phase.

INFLIGHT

Preset waypoints may be recalled from memory and put into active use as required.

1. Press the WPT key. If an active waypoint is displayed on the remote readout unit, the waypoint data will appear on the control unit display. Otherwise, the display will be blank.

2. Press the appropriate number key to select the desired waypoint. The preset waypoint data will replace any active waypoint data on the control unit display. The letter "P" is annunciated adjacent to the waypoint number to indicate that this is not the active waypoint. Information displayed on the remote readout unit, Horizontal Situation Indicator, and signals supplied to the flight control system will continue to reference the active waypoint and selected course.

3. Verify that the displayed data is correct.

NOTE

Revisions to the waypoint data can be programmed at this time by entering the new waypoint parameters. Entry of the first frequency digit blanks the remainder of the display.

4. When reference to the next waypoint is desired, press the USE key. The letter "P" is blanked to indicate that this is now the active waypoint. The Horizontal Situation Indicator NAV flag will momentarily come into view, the deviation signals supplied to the course deviation bar and flight control system will be zero, and the remote readout unit will be blanked until the NAV radios complete retuning to the new active waypoint.

5. Select the desired course on the Horizontal Situation Indicator course arrow.

NOTE

Any waypoint may be used without being preset (PRE key) by entering the waypoint data in the normal manner and immediately pressing the USE key. The waypoint data will be put into active use and also stored into memory.

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RNAV OPERATION

This is the normal mode of operation. If the VOR/DME radios are receiving valid signals from a colocated VOR/DME station, the ANS-31/NCS-31 computer will supply linear deviation information to the Horizontal Situation Indicator. The ENROUTE sensitivity, available when the flight control system is not in the approach mode, provides a constant course width of ±10 nautical miles. APPROACH sensitivity, available when the flight control system is in the approach mode, provides a constant course width of ±2 nautical miles. APPROACH sensitivity should be used when within ten nautical miles of the terminal waypoint.

Distance or time to the waypoint, waypoint number, and computed groundspeed are displayed on the remote readout unit. The ANS-31/NCS-31 computer combines inputs from the encoding altimeter with the VOR/DME station elevation to correct DME slant range error.

NOTE

The RNAV mode of operation requires the programming of station elevation to correct DME slant range error. Operation in this mode is recommended even if navigating directly toward or away from a VOR/DME facility. This provides the advantages of linear deviation and smooths the received signals to improve autopilot operation.

CONVENTIONAL VOR OPERATION

This is the mode of operation when either DME is not available or the DME is not colocated with the desired VOR facility. The VOR mode is annunciated by the letters "VOR" appearing on the control unit display in place of station elevation, and on the remote readout unit in place of ground speed. Raw DME distance will be displayed on the remote readout unit if a valid DME signal is received. However, slant range correction and computed ground speed will not be available. The ANS-31/NCS-31 computer supplies angular deviation information to the Horizontal Situation Indicator.

ILS OPERATION (Front Course and Back Course)

This is the mode of operation when the navigation receiver is tuned to a localizer frequency. The localizer mode is annunciated by the letters "LOC" appearing on the control unit display in place of station elevation, and on the remote readout unit in place of ground speed. Raw DME distance will be displayed on the remote readout unit if a valid DME signal is received. It is essential that only the inbound front course localizer bearing be set on the Horizontal Situation Indicator for both front course and back course approaches. This will assure the Flight Director display and autopilot maintain the proper left/right logic. Only angular deviation information is provided in the ILS mode.

DEAD RECKONING OPERATION

The ANS-31/NCS-31 will automatically enter the dead reckoning mode from either the enroute or approach RNAV mode whenever the VOR or DME signal is lost, or when passing over the VOR/DME station being used for navigation. Navigation calculations will continue using the ground speed and wind values available at the time the dead reckoning mode is entered. Changes in ground speed or wind velocity while in the dead reckoning mode will result in degradation of the accuracy of position estimates.

The loss of the VOR or DME signal for less than 9 seconds in the enroute mode or 1 second in the approach mode will not affect normal operation.

When operating in the enroute mode, loss of signal for more than 9 seconds forces the ANS-31/NCS-31 into dead reckoning. The dead reckoning mode is annunciated by displaying the letters "d-r" in place of ground speed on the remote readout unit. Recovery of the signal after 9 seconds but before 72 seconds returns the ANS-31/NCS-31 to the enroute mode and replaces the letters "d-r" with the normal ground speed display. If an invalid signal condition exceeds 72 seconds, the NAV flag on the Horizontal Situation Indicator will come into view and automatic reentry to the enroute mode will be inhibited.

Signal recovery after the NAV flag has been displayed is indicated by the ALERT light flashing. Normal operation may be regained by pressing the WPT key, the desired waypoint number key, and the USE key.

NOTE

A flashing ALERT light may also indicate crossing the TO/FROM line. This is verified by a zero distance or time to the waypoint displayed on the remote readout unit. Press the WPT key to extinguish the light.

When operating in the approach mode, loss of signal for more than 1 second forces the ANS-31/NCS-31 into dead reckoning. The letters "d-r" will again appear on the remote readout unit. Loss of signal in excess of 9 seconds causes the NAV flag on the Horizontal Situation Indicator to come into view. Recovery of the signal at any time returns the ANS-31/NCS-31 to the normal approach mode of operation and replaces the letters "d-r" with ground speed.

When operating under conventional VOR (including DME HOLD) conditions, the system will not enter dead reckoning in the event of an invalid signal. However, the NAV flag will be displayed and the annunciation "VOR" on the remote readout unit will be blanked.

WAYPOINT ALERT

Active waypoint approach is annunciated by an illuminated ALERT light on the remote readout unit when within 24 seconds flying time from the waypoint. This feature is available only in the enroute and approach RNAV modes of operation.

Crossing the TO/FROM line is indicated by a flashing ALERT light and reversal of the TO/FROM arrow on the Horizontal Situation Indicator. The ALERT light will automatically extinguish 24 seconds after crossing the TO/FROM line or it may be manually extinguished by pressing the WPT key.

DME HOLD OPERATION

The DME HOLD function inhibits changing the DME receiver frequency. Engaging DME HOLD and then selecting a new waypoint forces the ANS-31/NCS-31 into either a conventional VOR or LOC mode of operation according to the newly selected frequency.

If the waypoint to be selected is a conventional VOR or LOC waypoint, engage the DME HOLD as follows:

1. Press the DME HOLD key.

2. Select the new waypoint data on the scratch pad by pressing the WPT key and the appropriate waypoint number key.

3. Press the USE key once. The upper scratch pad of the control unit will display the letter "P", waypoint number, frequency and the letters "VOR" or "LOC". The lower scratch pad will display the active frequency on which the DME is to be held and the letters "dh" flashing on and off.

4. Verify the displayed data.

5. Press the USE key the second time. The NAV receiver will be tuned to the new waypoint frequency. The DME will remain tuned to the previously active frequency. The held DME frequency and the letters "dh" will be displayed steadily on the lower scratch pad, and also will appear on the remote readout unit in the place of waypoint number and computed ground speed. Raw DME distance to the held DME facility will be displayed on the remote readout unit.

NOTE

Only VOR radials may be flown with angular deviation provided.

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Releasing the DME HOLD key will tune the DME receiver to the active NAV frequency. The lower scratch pad on the control unit will be cleared. Raw DME distance (if the signal is valid), waypoint number, and the letters "VOR" or "LOC" will appear on the remote readout unit.

CAUTION

The DME HOLD function should not be used when navigating between RNAV waypoints. These waypoints require valid signals from colocated VOR and DME facilities to establish their geographical positions. If the VOR and DME receivers are not tuned to a colocated facility, the DME HOLD function will cause raw DME distance to the held facility to be displayed on the remote readout unit and angular deviation to the VOR facility on the Horizontal Situation Indicator.

Apprroved:

for Chester A. Rembleske
Beech Aircraft Corporation
DOA CE-2

BEECHCRAFT DUKE B60 LANDPLANES

FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT for the AIRDATA AD611/D AREA NAVIGATION/VERTICAL NAVIGATION SYSTEM

GENERAL

The information in this supplement is FAA-approved material and must be attached to the FAA Approved Airplane Flight Manual when the airplane has been modified by installation of the AirData AD611/D Area Navigation/Vertical Navigation System in accordance with Beech-approved data.

The information in this supplement supersedes or adds to the basic FAA Approved Airplane Flight Manual only as set forth within this document. Users of the manual are advised always to refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

The RNAV function of the AirData AD611/D system performs a vector computation that results in a visual display of the magnetic bearing and distance to or from a selected waypoint. The computer, in effect, moves the selected reference facility (VORTAC or colocated VOR/DME facility) to a different location called a waypoint. The waypoint, which is expressed in terms of nautical miles along a selected radial from the VORTAC, is programmed into the system on the Manual Waypoint Setter.

Steering guidance is presented as a left/right display on the Horizontal Situation Indicator (HSI). The display format differs from the conventional VOR course deviation of 10 degrees called "angular course deviation". Rather, course deviation is presented in nautical miles from the course centerline. This feature, referred to as "linear course deviation", provides for a constant course width irrespective of the distance to the waypoint. Two levels of sensitivity are available for area navigation. The enroute sensitivity, available when the APPR pushbutton on the system's range indicator is not activated, provides a constant course width of 5 nautical miles. Approach sensitivity, available with the APPR pushbutton depressed, provides a constant course width of 1.25 nautical miles. Approach sensitivity should be used when within ten nautical miles of the terminal waypoint.

The Multi-Waypoint Memory System is an option to the basic AD611/D Area Navigation Computer System. This system consists of a Horizontal Display Unit (61 HDU) and the Data Entry Unit (61DEU). These units may be used in conjunction with or in lieu of the Manual Waypoint Setter. The Multi-Waypoint System stores RADIAL/DISTANCE and TRACK/FREQUENCY information for up to 10 different waypoints. The memory does not erase when electrical power to the unit is turned off.

The VNAV function of the AirData AD611/D does not depend on interconnection with the encoding altimeter nor does it drive the vertical needle on the HSI. It does not depend on wind or groundspeed, but is based solely on vertical triangulation. The VNAV displays as a set of numbers the MSL altitude the airplane "should be at" for a 3.0 degree (330 feet per nautical mile) approach slope to the runway waypoint. The pilot compares the computed "should be at" altitude with the standard altimeter in the cockpit and manually adjusts the airplane flight path as required. The display takes into account the MSL elevation of the waypoint, which is a value entered by the pilot. There is also provision for entering the MDA value appropriate to the approach conditions. The "count down" of the altitude display ceases at the MDA value and the screen blinks to indicate that further descent must be based on visual observations. A 1.5 degree (165 feet per nautical mile) slope is also available. Operation is the same as for the 3 degree slope except NO MDA FUNCTION IS PROVIDED. A 1.5 degree descent should NEVER be used to a waypoint placed at a runway elevation.

LIMITATIONS

1. The area navigation system may not be used as a primary system under IFR conditions except on approved approach procedures, approved airways, and random area navigation routes when approved by Air Traffic Control.

2. This system can only be used with colocated facilities. (VOR and DME signals originate from same geographical location.)

3. An area navigation installation located on the right instrument panel may be used for primary navigation only if a qualified pilot occupies the right seat.

4. The vertical navigation system does not adversely affect any other airplane system. The computed vertical slope on those systems with the 61CAC controller is preprogrammed to a single value of 3.0 degrees. Systems with the optional 541CAC controller offer an additional 1.5 degree vertical slope. This mode MUST NOT be used for an approach descent. Pending publication of certification requirements, use of the 3.0 degree computed vertical slope to stabilize the flight path is permitted provided the maximum/minimum altitudes specified in the published procedures are observed.

EMERGENCY PROCEDURES

CAUTION

DME may unlock due to loss of signal with certain combinations of distance from station, altitude and angle of bank.

1. If NAV flag appears while in the enroute mode, check for correct frequency.

2. If VOR or DME equipment is intermittent or lost, utilize other navigation equipment as required.

3. If NAV flag appears during an approach, execute published missed approach and utilize another approved facility.

NORMAL PROCEDURES

The AirData AD611/D system is programmed and operated from a Digital Range/Mode Control unit, one or more Waypoint Setter Units, and a Command Altitude Computer for VNAV display. Frequency selection and course display are provided by the standard navigation controls and HSI.

CONTROLS AND DISPLAYS

DIGITAL RANGE/MODE CONTROL UNIT (RNAV 61 DRM)

1. RNAV ON-OFF Pushswitch:

   Used to activate and deactivate the RNAV system. It is a push on/push off switch that is backlighted whenever it is in the ON state. When selected ON, it connects the RNAV computer to the HSI. When selected OFF, the HSI display presents conventional VOR/LOC information.

2. APPR Pushswitch:

   Used to activate or deactivate the RNAV approach mode of operation. This operation increases the sensitivity of the HSI presentation and is used when approaching a waypoint in an approach to landing. The switch is blacklighted whenever it is switched ON.

3. Digital Display:

   Normally indicates the distance to the waypoint in nautical miles from present position. The airplane's standard DME distance indicator will continue to display DME distance to the reference VORTAC.

4. BRG Pushbutton:

   Used to temporarily cause the digital display to indicate the magnetic bearing from the airplane to the

FAA Approved
Revised: November, 1979
P/N 60-590001-41

selected waypoint. Valid VOR and DME signals must be received for this function.

5. TEST Pushbutton:

   Illuminates the three diagnostic annunciator lights to verify their operation. Temporarily causes the digital display to indicate the waypoint DISTANCE value entered on the active waypoint setter unit. Also, a reference bearing output is sent to the HSI which causes the left/right needle to center when the course selector is set to the RADIAL value entered on the active waypoint setter unit. Depressing both the TEST and BRG buttons simultaneously causes the waypoint RADIAL value entered on the active waypoint setter unit to appear on the digital display.

   These tests require at least 10 nautical miles to be set into the waypoint DISTANCE and reception of a valid VOR signal.

6. Diagnostic Lights:

   Each of the three fault annunciators will flash and the digital display will be blank under the specified conditions.

   DTW: Indicates the "distance to waypoint" computation cannot be made. This can be an excessive distance (over 199.9 N.M. to waypoint), excessive RADIAL setting (over 359.9°) or a computer malfunction.

   VOR: Indicates that computation quality of VOR signal has been lost.

   DME: Indicates a loss of DME signal.

WAYPOINT SETTER UNIT (RNAV 61 WPS)

1. RADIAL Thumbwheels:

   Set to indicate the bearing from the VOR to the waypoint. The DTW diagnostic annunciator will flash if a RADIAL entry exceeds 359.9 degrees or results in a distance-to-waypoint exceeding 199.9 nautical miles.

2. DISTANCE Thumbwheels:

   Set to indicate the distance from the VOR to the waypoint.

3. ACTIVATE Pushbutton:

   Depressing white pushbutton, located above the RADIAL thumbwheels, activates that waypoint setter unit, placing its RADIAL and DISTANCE information into the RNAV computer. In systems containing more than one waypoint setter unit, the number 1 unit is automatically activated when the RNAV ON-OFF switch is selected ON. Any other waypoint setter unit can then be activated by depressing the ACTIVATE pushbutton on the desired waypoint setter unit.

   Depressing the ACTIVATE pushbutton also performs a "fast update" function for the RNAV computer each time it is depressed. Fast update allows current VOR and DME information on airplane position into the computer without averaging out the errors in these signals. Fast update would be used after channeling a new frequency into the NAV equipment, after regaining DME lock-on, or after changing a thumbwheel setting on an active waypoint setter unit.

4. Waypoint Indicator Light:

   Yellow light, located above DISTANCE thumbwheels, illuminates whenever its waypoint setter unit is activated. These lights are numbered when more than one waypoint setter unit is installed.

HORIZONTAL DISPLAY UNIT (61 HDU)

1. RADIAL/DISTANCE Pushswitch:

Depressing pushswitch causes RADIAL (upper line) and DISTANCE (lower line) information to be displayed from either the active waypoint or from a new waypoint being entered into the MEMORY.

2. TRACK/FREQUENCY Pushswitch:

   Depressing pushswitch causes prestored TRACK and FREQUENCY information for the selected waypoint to be displayed.

DATA ENTRY UNIT (61 DEU)

1. ACTIVE Pushbutton:

   This pushbutton selects the Memory Waypoint System for use when installed in conjunction with a Manual Waypoint Setter (61WPS). The pushbutton also engages the AD611/D computer "Fast Update".

2. MEMORY Pushbutton:

   Pressing pushbutton opens the MEMORY allowing data to be stored in the MEMORY. After data has been entered, pressing the pushbutton again closes the MEMORY and permanently stores the data.

3. Thumbwheel "SCRATCH PAD":

   Set to indicate information to be entered into MEMORY.

4. ENTER Pushbuttons:

   Pushbuttons are pressed after MEMORY is opened to enter "SCRATCH PAD" data into the waypoint MEMORY; Upper pushbuttons enter RADIAL or TRACK information and the lower pushbuttons enter DISTANCE or FREQUENCY information.

5. WAYPOINT Number Window:

   This window displays the number of the waypoint currently selected.

6. WAYPOINT Select Pushbuttons:

   These pushbuttons, located above and below the waypoint number window, are used to change the waypoint number selected to a larger number (upper pushbutton) or a smaller number (lower pushbutton).

COMMAND ALTITUDE COMPUTER (VNAV 541CAC)

1. Digital Display:

   Normally displays COMMAND ALTITUDE (altitude MSL that airplane currently "should be at" in order to achieve a 3°/330 feet per nautical mile approach descent angle to the runway waypoint or a 1.5°/165 feet per nautical mile cruise descent). It also displays values set for waypoint altitude and, in the 3° descent, MDA.

2. ON Lamp/Pushbutton:

   An illuminated push-on/push-off switch which illuminates when in the ON position. Turns the VNAV computer ON.

3. ALT-SET-MDA Switch:

   ALT position enters the value set by the rotary knob into the computer for desired altitude at the waypoint. MDA position enters the value set by the rotary knob for minimum decision altitude into the computer. It should be in the SET position for normal VNAV operation.

FAA Approved
Revised: November, 1979
P/N 60-590001-41

4. 1.5°/3° Lamp/Pushbuttons:

   When pushed these switches select either the 1.5° or 3° descent angle. The appropriate switch illuminates when that descent angle is selected.

5. Rotary Knob:

   Sets the altitude MSL of the waypoint or the minimum decision altitude, depending on the setting of the ALT - SET - MDA Switch.

PREFLIGHT (MANUAL WAYPOINT SELECTOR)

The preflight check is to test the computation accuracy of the computer and to assure the proper operation of the controls and displays. This procedure should be completed prior to programming for the intended flight.

1. Depress RNAV pushswitch to ON.
2. Set RADIAL thumbwheels to 000.0°.
3. Set DISTANCE thumbwheels to 25.0 NM.
4. Set NAV 1 receiver to a VOR or VORTAC within receiving range.
5. Press and hold TEST button. Adjust course control on HSI to produce centered needle with "TO" indication. Check that:
   a. Digital display indicates 25.0 ± 1 NM.
   b. The course setting is 000 ± 2 degrees.
6. Press and hold BRG and TEST buttons. Check that:
   a. Digital display indicates 0 ± 1 degree.
7. Release BRG and TEST buttons.

NOTE

If any of the preflight tests are not within the prescribed tolerances, the RNAV system will not meet the required standards of accuracy. Corrective adjustment or maintenance is required. This procedure does not test the DME.

PREFLIGHT (Multi-Waypoint Memory System)

To preflight check the RNAV system using the Multi-Waypoint Memory System prior to flight, the following procedure should be used.

1. Depress RNAV pushswitch to ON.
2. Press ACTIVE pushbutton on Data Entry Unit (providing unit is used in conjunction with one or more manual waypoint setters).
3. Firmly press MEMORY pushbutton to open MEMORY (Horizontal display unit readout will flash indicating MEMORY is open).
4. Set thumbwheel "SCRATCH PAD" to 000.00.
5. Press upper ENTER button to enter data into MEMORY.

6. Set thumbwheel "SCRATCH PAD" to 25.00.

7. Press lower ENTER pushbutton.

8. Set NAV 1 receiver to VOR or VORTAC within receiving range.

9. Press and hold TEST button. Adjust course control on HSI to produce centered needle with "TO" indication.

   a. Digital display indicates 25.0 ± 1 NM.

   b. Course setting is 000 ± 2 degrees.

10. Press and hold BRG and TEST buttons. Check that digital display indicates 0 ± 1 degree.

11. Release BRG and TEST buttons.

NOTE

If any of the preflight tests are not within the prescribed tolerances, the RNAV system will not meet the required standards of accuracy. Corrective adjustment or maintenance is required. This procedure does not test the DME.

PROGRAMMING

1. RNAV ON-OFF Pushswitch - ON (switch illuminated)

NOTE

The number 1 waypoint setter unit is automatically selected when the RNAV pushswitch is turned ON.

2. Waypoint Definition - Determine in terms of RADIAL and DISTANCE from a specific VORTAC.

NOTE

The maximum allowable RADIAL setting is 359.9 degrees. If a RADIAL of 360.0 degrees is desired, use a value of 000.0 degrees. The maximum allowable DISTANCE setting is 199.9 NM. The maximum allowable range from the airplane to the waypoint is also 199.9 NM. If any of these restrictions are exceeded, select a waypoint that is within these values.

3. Manual Waypoint Setter Units or Multi-Waypoint Memory System.

   a. Manual Waypoint Setters - Set RADIAL and DISTANCE thumbwheels.

   b. Multi-Waypoint Memory System - Enter data.

      1. Press MEMORY pushbutton to "open" MEMORY - Digital display will blink.

      2. Select category of data to be entered - (RADIAL/DISTANCE or TRACK/FREQUENCY) and press appropriate pushswitch.

      3. Select waypoint number.

FAA Approved
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P/N 60-590001-41

4. Set proper data on "SCRATCH PAD" thumbwheels.

5. Enter data - If RADIAL or TRACK data, press upper ENTER pushbutton; If DISTANCE or FREQUENCY data, press lower ENTER pushbutton.

NOTE

RADIAL/DISTANCE information entered is used by the RNAV to compute course information. TRACK/FREQUENCY information entered is used as a reference only and is provided as a reminder of what information is pertinent to that waypoint. TRACK/FREQUENCY information is not used by the RNAV for computation of any kind.

6. Check digital display for proper data entry.

7. Press MEMORY pushbutton to close MEMORY, digital display will stop blinking.

NOTE

The MEMORY does not erase when power to the RNAV unit is turned off.

4. NAV Receivers (VOR and DME) - ON. Frequency set.

5. Digital Display - Check to insure that distance to waypoint value appears.

6. HSI Course Control - SET to desired magnetic course.

ENROUTE

Using the AirData AD611/D system enroute corresponds to flying VOR airways, except navigation is now to or from waypoints. The waypoint parameters (radial and distance) in effect "move" the VORTAC. Once this is accomplished, the horizontal situation indicator and AD611/D digital range indicator will provide guidance to the waypoint similar to conventional VOR/DME navigation. The only notable difference is that the course deviation needle on the HSI will maintain a constant sensitivity of ± 5 nautical miles irrespective of the distance to the waypoint. The range indicator will count down to approximately 0.2 nautical mile when, upon reaching the waypoint, the "TO" flag will change to "FROM".

When the next waypoint is required for navigation, depress the ACTIVE pushbutton on the next waypoint setter unit in sequence, confirm the proper VORTAC frequency is set, and set the desired magnetic course on the horizontal situation indicator.

The next waypoint is selected on the Multi-Waypoint Memory System by pressing the appropriate waypoint select pushbutton until the desired waypoint number appears in the waypoint number window.

NOTE

If an ILS frequency is selected on NAV 1 while in an RNAV mode, the NAV flag will appear on the horizontal situation indicator and the VOR diagnostic light will flash. The RNAV must be selected OFF for ILS or conventional VOR operation (except for Approach Range Monitor operation).

Data may be entered into the MEMORY system or data already entered may be reviewed while the system is being used in flight. The MEMORY may be opened at any time to enter or review data. When this happens, the waypoint data currently being used is locked in to the computer; the RNAV continues to use

this data for navigation while the MEMORY is open. Data may be entered at this time as previously described. After all desired data changes or reviews have been made, the MEMORY is closed. This causes the data displays to revert back to the currently active waypoint.

APPROACH

Using the AirData AD611/D system for an approach is similar to making a localizer approach. However, the system is using VOR and DME information and the MDA will be higher than when conducting a precision approach. Insert the waypoint parameters from the approach chart into the waypoint setter units. These parameters must be taken from an approved RNAV approach procedure for IFR operations. Activate the approach mode by depressing the APPR pushswitch. This will increase the horizontal situation indicator navigation sensitivity to a ± 1.25 nautical miles course width. For smoother operation, the computed distance to the waypoint should not exceed 30 nautical miles while in the approach mode.

Set the appropriate inbound course to each waypoint in turn and depress the ACTIVATE pushbutton on the appropriate waypoint setter unit to establish the next waypoint. If landing cannot be made upon reaching the MAP, follow the missed approach procedure outlined on the approved plate.

VERTICAL NAVIGATION (VNAV 541CAC)

PROCEDURES FOR 3° DESCENT ANGLE

The digital display screen of the Command Altitude Computer (CAC) indicates the altitude the airplane "should be at" on a descent profile of 3.0° (330 feet per nautical mile) to the runway waypoint. The screen will count down as the airplane proceeds toward the runway waypoint and will count up as the airplane flies from the runway waypoint. The display will stop counting when the airplane should be at the MDA, at which point the display will flash the MDA value. The maximum altitude of the display is 9900 feet.

1. ALT-SET-MDA Switch - ALT Position.
2. Rotary Knob - TURN until altitude MSL of runway waypoint shows in display.
3. ALT-SET-MDA Switch - MDA Position.
4. Rotary Knob - TURN until altitude MSL of MDA shows in display.
5. ALT-SET-MDA Switch - SET Position.

Immediately prior to reaching descent waypoint:

6. ON Button - PRESS.
7. 3° Button - PRESS.
8. Command Altitude - READ from digital display.
9. MDA Reached - Display starts flashing and stops decreasing.

CAUTION

It is essential that the runway end waypoint setter unit be activated when the Command Altitude Computer is being used. DO NOT activate the VNAV while navigating to the Final Approach Fix waypoint.

PROCEDURES FOR 1.5° DESCENT ANGLE

The digital display screen of the Command Altitude Computer indicates the altitude the airplane "should be at" on a cruise descent profile of 1.5° (165 feet per nautical mile) to a selected altitude at a waypoint. The

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P/N 60-590001-41

screen will count down as the airplane proceeds toward the waypoint. The display screen will commence flashing while counting down when the airplane is within 1000 feet of the set altitude. The 3° lamp also commences flashing at this time to assure the pilot is aware that the 3° slope must be selected to complete an approach.

1. Complete steps 1 thru 4 for 3° slope.
2. ALT-SET-MDA Switch - ALT Position.
3. ON Lamp/Pushbutton - ON.
4. 1.5° Lamp/Pushbutton - PUSH, 3° lamp extinguishes and 1.5° lamp illuminates.

Within 1000 feet of set altitude the CAC display and 3° lamp commence flashing. Countdown of altitude continues.

CAUTION

This 1.5° slope is NOT to be used as an approach descent.

5. 3° Lamp/Pushbutton - PUSH, 3° altitude data presented.

or

6. ALT-SET-MDA Switch - SET Position, 3° altitude data presented.

APPROACH RANGE MONITOR

The Approach Range Monitor feature provides for the separation of the RNAV computed range to a waypoint from the steering guidance of the pilot's horizontal situation indicator. Selecting the Approach Range Monitor switch to the RANGE MONITOR position will connect the RNAV computer to the NAV 2 receiver. The pilot's horizontal situation indicator will be retained on the NAV 1 receiver.

On an ILS approach, for example, it is desirable to know distance to the outer marker and then to the runway threshold. By selecting RANGE MONITOR and setting the appropriate NAV 2 frequency and waypoint parameters in the waypoint setter unit, the distance to the desired fix will be continuously displayed while ILS steering guidance on the horizontal situation indicator will be conventional. The result is the ability to fly a localizer of full ILS steering situation while retaining RNAV computed distance to a selected fix.

CAUTION

It is imperative the Approach Range Monitor switch be placed in the NORMAL position during RNAV operations. If left in the RANGE MONITOR position, the range display will be based on the NAV 2 frequency and waypoint setter unit parameters, and the pilots horizontal situation indicator will display conventional VOR steering based on the selected NAV 1 frequency.

PERFORMANCE - No Change.

Approved:

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DOA CE-2

BEECHCRAFT DUKE B60 LANDPLANES

PILOT'S OPERATING HANDBOOK AND
FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT

for the

COLLINS ANS-351 AREA NAVIGATION SYSTEM

GENERAL

The information in this supplement is FAA approved material and must be attached to the *Pilot's Operating Handbook and FAA Approved Airplane Flight Manual* when the airplane has been modified by installation of the Collins ANS-351 Area Navigation System in accordance with Beech FAA Approved Data.

The information in this supplement supersedes or adds to the basic *Pilot's Operating Handbook and FAA Approved Airplane Flight Manual* only as set forth within this document. Users of the manual are advised always to refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

LIMITATIONS

1. The Area Navigation function may not be used as a primary system under IFR conditions except on approved approach procedures, approved area navigation airways, and random area navigation routes when approved by Air Traffic Control.
2. The Area Navigation function can only be used with collocated facilities. (VOR and DME signals originate from the same geographical location.)
3. The maximum distance for waypoint location is 199 nautical miles from the VOR/DME facility.
4. Approach mode should be restricted to distance of 50 nautical miles or less from the waypoint in use.

EMERGENCY PROCEDURES

CAUTION

DME may unlock due to loss of signal with certain combinations of distance from station, altitude, and angle of bank.

1. If NAV flag appears while in the enroute mode, check for correct frequency.
2. If VOR or DME equipment is intermittent or lost, utilize other navigation equipment as required.
3. If NAV flag appears during an approach, execute published missed approach and utilize another approved facility.

NORMAL PROCEDURES

1. NAV receivers - ON
2. Presetting waypoints on the ground:

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NOTE

When power is first applied to the ANS-351 and the system is in the RNAV mode, WPT 1 will be active and waypoint bearing and distance indicators will read zero.

a. WPT 1 coordinates are set into the ANS-351 using the concentric knobs under the bearing and distance display fields.

b. The waypoint selection knob is then rotated to select WPT 2. Note that the waypoint number is blinking, indicating that the waypoint is inactive at this point. WPT 2 bearing and distance definitions are then set into the ANS-351.

c. Set up the rest of the desired waypoints as described above. The ANS-351 has memory capacity for 8 waypoints.

d. Press the RTN (return) push button to display the active waypoint.

3. Changing waypoints in flight:

a. Select heading mode on the autopilot if engaged.

b. Rotate the waypoint selector until the desired waypoint number and coordinates are displayed.

c. Verify that the new waypoint definition is correct by comparing the display to the flight plan.

d. Select the desired reference frequency on the associated navigation receiver and positively identify by listening to the "ident" tone.

e. Select the desired course on the OBS (Omni Bearing Selector).

f. Press the USE button on the ANS-351 and note that the waypoint identification number stops blinking.

g. Select the NAV mode on the autopilot after the deviation and distance-to-waypoint indications have stabilized.

4. Presetting waypoints in flight (RNAV mode):

Waypoints may be preset in flight without disturbing the navigational outputs.

a. Rotate the waypoint selector knob to display the waypoint number to be preset. Note blinking waypoint number.

b. Set into the ANS-351 the desired waypoint bearing and distance.

c. Press the RTN (return) push button and note that the presently used waypoint is displayed.

5. Presetting waypoint in flight (VOR/LOC modes):

If the system is in VOR or LOC mode the ANS-351 will annunciate these modes on the display.

a. Rotate the waypoint selector knob and note that the VOR or LOC annunciator is replaced by waypoint number, bearing, and distance. The waypoint number will always be blinking and the USE push button will be inactive.

b. Preset the waypoint bearing and distances.

FAA Approved
Issued: December 29, 1977
P/N 60-590001-43

c. Press the RTN (return) push button and observe the annunciation of VOR or LOC on the ANS-351 panel.

PERFORMANCE

No change.

SYSTEM DESCRIPTION

1. Navigation System Mode Control - A four position switch, located on the instrument panel or DME control head, is used to select the navigational mode of operation, either RNAV or VOR.

2. The Collins DME indicator used with the computer in the RNAV mode displays distance to the active waypoint in nautical miles, time to the waypoint in minutes, and all angle ground speed in knots (i.e. the airplane does not have to be on a course directly to a waypoint to display a valid groundspeed). A green annunciator light on the indicator is illuminated any time the system is in the RNAV mode and power is applied to the NAV receiver.

After initiating the RNAV mode, always observe the ground speed over a period of 2 minutes or more to ensure that the indication has reached a steady-state value.

3. ANS-351 Area Navigation Computer

   a. Collins Mode Control (ENR/APPR) - Use of this control allows selection of either ENR (enroute) or APPR (approach) modes of operation. In the enroute mode the course deviation is 5 nautical miles full scale. In the approach mode the course deviation is 1.25 nautical miles full scale deflection of the CDI, (Course Deviation Indicator).

   b. Waypoint Selector (WPT) - Sequences display waypoints from 1 through 8. Winking waypoint number indicates nonactive waypoints; steadily on waypoint number indicates the active waypoint.

   c. Radial Selector - Two concentric knobs can be used to set radial information into the display. Knobs control information as follows:

      Large knob: Changes the display in 10-degree increments.

      Small knob, pushed in: Changes the display in 1-degree increments.

      Small knob, pulled out: Changes the display in 0.1-degree increments.

   d. Distance Selector - Two concentric control knobs can be used to set distance information in nautical miles into the display.

      Knobs control information as follows:

      Large knob: Changes the display in 10-nautical mile increments.

      Small knob, pushed in: Changes the display in 1-nautical miles increments.

      Small knob, pulled out: Changes the display in 0.1-nautical mile increments from 00.0 through 100 miles. Beyond 100 NM, changes the display in 1-mile increments.

   e. Return Button (RTN) - Pressing RTN returns the display to the active waypoint when a nonactive waypoint is currently being displayed.

   f. Use Button (USE) - Pressing the USE button converts the waypoint being displayed into the active waypoint.

g. Check Button (CHK) - Pressing the CHK button causes normal slant range DME distance to the VOR/DMC station to be presented on the DME indicator. The WPT annunciator on the DME indicator will extinguish during this time. If TO or FROM is selected on the Collins NAV receiver, the magnetic bearing to or from the VOR/DME station will be displayed. The WPT annunciator light on the NAV receiver will extinguish during the time the CHK button is held down. If an RMI is installed, and is compatible with the ANS-351, pressing the check button will cause the bearing pointer to indicate the bearing to the active VOR station. RNAV computation, CDI deviation, TO/FROM display, and autopilot tracking of RNAV path remain unaffected. The check button is spring loaded to prevent prolonged actuation.

h. Ambient Light Sensor - Automatically adjusts display lighting intensity as a function of cockpit ambient light.

4. Collins Navigation Receiver (NAV).

a. OFF - Controls power to the NAV receiver and to the Area Navigation Computer.

b. FREQ - Allows the selection of VOR and Localizer frequencies.

c. TO - Displays airplane magnetic bearing to the VOR station in the normal mode and airplane magnetic bearing to the waypoint in the RNAV mode.

d. FROM - Displays airplane magnetic bearing from the VOR station in the normal mode, and airplane bearing from the waypoint in the RNAV mode.

e. WPT Annunciator - Light is illuminated any time the NAV receiver is on, the RNAV mode is selected, and CHK button is not depressed.

f. Ambient Light Sensor - Automatically adjusts display lighting intensity as a function of cockpit ambient light.

5. CDI (Course Deviation Indicator)

a. Operation of the CDI in the RNAV mode differs from the operation in the VOR mode as follows:

1. Indicator movement represents a *linear* deviation from the selected course.

2. In the enroute mode, full scale deviation is 5 NM. In the approach mode, the full scale deflection is 1.25 NM.

3. If an annunciator light is installed on the instrument panel it will illuminate any time power is applied to the NAV receivers and the system is in the RNAV mode. (INSTALLATION OF THIS LIGHT IS DEPENDANT ON THE DME INSTALLED.)

6. RMI Bearing

An output is provided by the ANS-351 that allows an RMI with built-in NAV converter to display bearing to or from the waypoint while operating in the RNAV mode. (NOTE: An RMI may or may not be installed to work in conjunction with the RNAV computer).

Approved:

for Donald H Peters

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BEECHCRAFT DUKE B60

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT

for the

BENDIX NP-2041A NAV COMPUTER PROGRAMMER

GENERAL

The information in this supplement is FAA-approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the airplane has been modified by installation of the Bendix NCP-2040 Nav Programmer System with the NP-2041A Nav Computer Programmer in accordance with Beech-approved data.

The information in this supplement supersedes or adds to the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only as set forth within this document. Users of the manual are advised always to refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

LIMITATIONS

1. The Area Navigation Function may not be used as a primary navigation system under IFR conditions, except on approved approach procedures, approved area navigation airways, and random area navigation routes when approved by Air Traffic Control.
2. The maximum distance for waypoint location is 199.9 nautical miles from the station.
3. The Area Navigation Function can only be used with colocated facilities (VOR and DME signals originate from the same geographical location).

EMERGENCY PROCEDURES

1. If either VOR or DME signals are lost in the RNAV mode, BRG and DST will both be dashed and the indicator will display a Nav flag. To identify the lost signal, return to the VOR/LOC mode. In this mode only the window displaying the lost signal (BRG or DST) will be dashed; and if the NAV signal is valid, basic VOR nav operation is restored.

NOTE

If the mode is returned to VOR/LOC the NP-2041A will display course data directly to the VORTAC.

CAUTION

The DME may unlock due to loss of signal with certain combinations of distance from the station, altitude, and attitude.

2. If the system automatically displays a lamp test, an internal failure in the NP-2041A is indicated. If a failure is observed, do not use the NP-2041A for area navigation.
3. A dashed EL display window indicates an altimeter flag. Area navigation is still possible, but without slant range correction.

FAA Approved
Issued: February, 1979
P/N 60-590001-45

NORMAL PROCEDURES

1. Master Avionics Switch - ON
2. CNA 2010 Nav/Com System - ON
3. DME - ON
4. DME Selector Switch - N1 (if CN-2011A is installed)
5. Tuning Selector Switch(s) - KBD (with selector in KBD the NP-2041A Nav Computer Programmer will automatically tune the VOR and DME when waypoints are changed.)

NOTE

The NP-2041A NAV Computer Programmer is now coupled to the CNA 2010 NAV/COM System. Only the No. 1 VOR and DME receivers supply information to the NP-2041A NAV Computer Programmer.

6. Mode Selector Switch - RNAV
7. Display Selector Switch - SBY
8. SBY/WPT Key - PRESS
9. No. 1 Key - PRESS (Note the No. 1 indicated in the SBY display window) Program Standby Waypoint Number 1 parameters in any sequence. Press ENTER key after each parameter programmed.

NOTE

Pressing anyone of the FREQ, BRG, DST, EL, or CRS keys causes a flashing dot to appear in the associated display window. A flashing dot indicates the parameter that is being addressed. As number keys corresponding to data are pressed, the numbers appear in the addressed window. If valid data is entered into the window, the flashing dot will extinguish when the ENTER key is pressed. If invalid data is entered in the window, the data will be rejected when the ENTER key is pressed. The window will revert to a flashing dot which indicates data should be reentered.

VALID DATA LIMITS

NAV Frequency - 108.00 to 117.95 (.05 steps)
COM Frequency - 118.00 to 135.97 (.025 steps)
BRG - 000.0 to 359.9 degrees
DST - 0.0 to 199.9 nautical miles
EL - 00 to 99 (100-ft increments)
CRS - 000 to 359 degrees

10. PROGRAM DATA.

    a. STATION FREQUENCY - Press FREQ key. Press number keys corresponding to the frequency of the VOR/DME station. Press the ENTER key.
    b. WAYPOINT BEARING - Press BRG key. Press number keys corresponding to the bearing to the waypoint from the VOR/DME station. Press the ENTER key.
    c. WAYPOINT DISTANCE - Press DIST key. Press number keys corresponding to the distance of the waypoint from the VOR/DME station. Press the ENTER key.
    d. STATION ELEVATION - Press EL key. Press number keys corresponding to the VOR/DME station elevation in hundreds of feet. Press the ENTER key.
    e. INBOUND AND OUTBOUND COURSE - Press course transfer button, CRS XFR, if required, to illuminate CRS IN. Press CRS key, then the number keys corresponding to the desired inbound course. Press the ENTER key. Press CRS XFR key to illuminate CRS OUT. Press CRS key when the number keys corresponding to the desired outbound course. Press the ENTER key. (Note that pressing the ENTER key causes a transfer back to CRS IN.)

FAA Approved
Issued: February, 1979
P/N 60-590001-45

NOTE

If a wrong number is pushed while programming, momentarily move the display switch from SBY to ACT then return to SBY. Press desired function and correct numbers followed by ENTER.

11. WPT XFR - PRESS. Program next and successive waypoints. After each waypoint is programmed, pressing WPT XFR button transfers that waypoint to the ACT window and displays the next consecutive waypoint in the SBY window.

USING A PROGRAMMED WAYPOINT

1. SBY/WPT Key - PRESS
2. Press number key corresponding to the waypoint desired to be recalled from memory and verify data.
3. WPT/XFR - PRESS to transfer STBY waypoint to ACTive. When the standby waypoint is activated the inbound course to the waypoint will be automatically set in the HSI and the CRS window will display the inbound course for approximately 30 seconds (if display switch is in either BRG/DST or KTS/TTS). The CRS IN/OUT annunciator will display IN. (If CRS IN/OUT annunciator display is initially showing OUT, and display selector is in BRG/DST or KTS/TTS, transferring a waypoint from SBY to ACT will not change CRS annunciator from OUT to IN. An IN indication can be obtained by cycling the display switch to ACT or SBY then back to desired position.)

NOTE

With the mode selector switch set to VOR/LOC the following data is displayed.

DISPLAY SELECTOR SET TO SBY - Data stored for standby waypoint (number appearing in SBY window) is displayed, and can be altered as desired.

DISPLAY SELECTOR SET TO ACT - Data stored for active waypoint (number in ACT display window) is displayed, but cannot be altered.

DISPLAY SELECTOR SET TO BRG/DST - Bearing and distance to the selected VOR/DME station are displayed on the Nav Programmer. (FREQ, EL, and CRS windows will be blank).

DISPLAY SELECTOR SET TO KTS/TTS - Ground speed in knots and time-to-station are displayed in minutes on the Nav Programmer. (FREQ, EL, and CRS windows will be blank.)

HSI - The HSI presents unprocessed information with conventional angular sensitivity, i.e., full scale deviation equals 10 degrees off course.

With the Mode Selector switch set to RNAV, the following data is displayed.

DISPLAY SELECTOR SET TO SBY - Data stored for standby waypoint (number appearing in SBY window) is displayed, and can be altered as desired.

DISPLAY SELECTOR SET TO ACT - Data stored for active waypoint (number appearing in ACT window) is displayed, but cannot be altered.

DISPLAY SELECTOR SET TO BRG/DST - Bearing and distance to the selected waypoint are displayed on the Nav Programmer. (FREQ, EL, and CRS windows will be blank.)

DISPLAY SELECTOR SET TO KTS/TTS - Ground speed in knots and time-to-waypoint in minutes are displayed on the Nav Programmer. (FREQ, EL, and CRS windows will be blank.)

HSI - The HSI presents RNAV information with linear deviation, full scale deflection representing 5 nautical miles off course out to a distance of 100 nautical miles. Beyond 100 nautical miles deviation is angular with full scale deflection representing 3 off course.

With the Mode selector set to APR, the displays are the same as RNAV, except full scale deviation represents 1.25 nautical miles off course out to 25 nautical miles. Beyond 25 nautical miles, full scale deviation represents 3 degrees off course.

4. Display Selector switch - BRG/DST or KTS/TTS.

NOTE

The Display switch position does not affect navigation output signals to the HSI or autopilot.

5. CRS XFR Button - PRESS at waypoint passage. If selector switch is in BRG/DST or KTS/TTS the outbound course will automatically be set in the HSI and the CRS window will display the outbound course for approximately 30 seconds. CRS IN/OUT annunicator will display OUT. If outbound course was not programmed, 0 degrees will be displayed. (If display switch is in SBY or ACT outbound course will not be automatically set in the HSI.)
6. WPT XFR - PRESS to activate next and succeeding waypoints.

LPP (LOAD PRESENT POSITION)

1. Mode Selector switch - RNAV
2. Display Selector switch - SBY, ACT, BRG/DST, or KTS/TTS.
3. LPP button - PRESS (When pressed, this function stores in waypoint "0" the actual bearing and distance of the airplane relative to the VOR/DME station in the active waypoint. The frequency and elevation of the active waypoint are stored in waypoint "0" as well. The LPP function will "write over" any other data which may be stored in waypoint "0".)

COM/NAV FREQUENCY MANAGEMENT

If the COM/NAV frequency selectors are in the KBD position, Com and Nav frequencies may be selected from the nav computer keyboard in any operational or display mode, except TEST. Nav 1, however, cannot be changed from the keyboard while in the RNAV or APR mode.

REPROGRAMMING A WAYPOINT

1. Waypoint to be changed must be removed from active status and displayed in SBY window.
2. Display switch - SBY.
3. Press function button, followed by correct numbers and ENTER.

MEMORY HOLD

When the Mode Selector switch is placed in the OFF position, waypoints are retained in memory even with the Avionics Master switch and Battery switch OFF. This condition is recognized by the blinking H button on the Nav/Com unit. If the airplane is to be stored for a long period of time, or, if stored waypoints are no longer needed, memory hold may be cancelled by pressing the H button.

FAA Approved
Issued: February, 1979
P/N 60-590001-45

SYSTEM SELF TEST

1. Tune NAV 1 and check for a valid bearing signal.
2. Select CRS on the ECDI (if installed and connected to NAV 1).
3. Set Mode Select switch to TEST, Display Select switch to BRG/DST. Allow 30 seconds for RNAV test bearing to stabilize.
4. Check for the following indications on the HSI:

   a. Course Indicator slews to 360 degrees and CDI centers (2 degrees)
   b. TO/FROM Flag - FROM
   c. NAV Flag - in view
   d. Increasing CRS to 10 2 should cause full right deflection of CDI.
   e. Decreasing CRS to 350 2 should cause full left deflection of CDI.

5. Check for the following indications on the ECDI: (if installed)

   a. CDI centered (2 degrees)
   b. TO/FROM Indicator - FR
   c. DME (if installed) - 30.0
   d. Increasing CRS to 10 2 should cause full right deflection of CDI.
   e. Decreasing CRS to 350 2 should cause full left deflection of CDI.
   f. Press Reciprocal button - Course should change to 180 with a TO indication.

6. Check for the following indications on the Nav Programmer (NP-2041A).

   a. FREQ, EL, and CRS windows dashed
   b. 180.5 degrees in BRG window
   c. 30.0 in the DST window

LAMP TEST

A lamp test can be performed by placing the SQ/OFF/L switch on the COM/NAV unit in the "L" position. Normal indications are as follows:

1. Hundred MHz numerals equal 1 on Nav Programmer and NAV/COM unit.
2. All other numerals equal 8 on the Nav Programmer, NAV/COM unit, and ECDI's.
3. CRS "IN/OUT" and keyboard contact annunciator lamp are illuminated.
4. Marker Beacon lights on NAV/COM unit (marker sensitivity high or low) and remote marker lights (if installed) are illuminated.
5. Hold button illuminates.

PERFORMANCE - No change

Approved:

for Donald H. Peters

W. H. Schultz
Beech Aircraft Corporation
DOA CE-2

BEECHCRAFT DUKE B60 LANDPLANE
PILOT'S OPERATING HANDBOOK AND FAA APPROVED
AIRPLANE FLIGHT MANUAL SUPPLEMENT
for the
KING KNS-81 INTEGRATED NAVIGATION SYSTEM

GENERAL

The information in this supplement is FAA-approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight manual when the airplane has been modified by installation of the King KNS-81 Navigation System in accordance with Beech-approved data.

The information in this supplement supersedes or adds to the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only as set forth within this document. Users of this manual are advised always to refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

LIMITATIONS

1. The Area Navigation mode may not be used as a primary system under IFR conditions except on approved approach procedures, approved airways, and random area navigation routes when approved by Air Traffic Control.

2. The Area Navigation and VOR-PAR modes can only be used with colocated facilities (VOR and DME signals originate from the same geographical location).

3. VOR or VOR-PAR modes must be selected when flying directly to or from a VORTAC facility.

EMERGENCY PROCEDURES

CAUTION

DME may unlock due to loss of signal with certain combinations of distance from station, altitude and angle of bank.

1. If NAV flag appears while in the Area Navigation mode, use CHK button to check for validity of raw DME and VOR data.

2. If VOR or DME equipment is intermittent or lost, utilize other navigation equipment as required.

3. If NAV flag appears and/or DME information is lost during an approach, execute published missed approach and utilize another approved facility.

NORMAL PROCEDURES

PREFLIGHT

AREA NAVIGATION FUNCTIONAL TEST

The following procedure applies only to airports equipped with, or in range of, a colocated VOR/DME station.

1. Place the KNS-81 in VOR mode.

2. Find and record the angle from the VOR station by centering the course deviation needle with the TO/FROM flag giving a "FROM" indication.

3. Program a waypoint radial angle equal to the OBS value determined in Step 2.

4. Program a waypoint distance equal to the indicated DME value.

5. Place the KNS-81 in RNAV.

The KNS-81 is operating properly if the distance to waypoint is 0 + 1.0 NM and the course deviation needle is within a dot of being centered.

PROGRAMMING

Pertinent information (waypoint number, station frequency, waypoint radial, and waypoint distance) for up to nine waypoints can be entered into the memory. Programming may be completed prior to takeoff or during the flight. Any combination of navigational facilities (RNAV waypoint, VOR/DME, ILS) may be loaded into the computer; however, it is desirable that each facility be numbered and loaded in the sequence it is to be used.

RNAV WAYPOINTS

1. Turn the system on by rotating the ON/OFF switch clockwise.

2. Put waypoint 1 in the WPT window by turning the WPT knob. Turn the knob in either direction to get "1".

3. Select the waypoint 1 frequency using the data input controls which are the two concentric knobs on the right.

4. Select the waypoint 1 radial by depressing the DATA button. This will move the >< (caret) from FRQ to RAD. Select the new radial with the data input controls.

5. Select the waypoint 1 distance by again depressing the DATA button. This will move the >< from RAD to DST. Select the new distance with the data input controls.

6. This completes the programming for the first waypoint. Follow these procedures for all selected waypoints up to a maximum of nine.

CONVENTIONAL VOR

1. The programming technique for conventional navigation directly toward or away from a VOR facility without a colocated DME is similar to that for RNAV waypoints. Putting the waypoint number and frequency into the memory is accomplished in the same manner. The RAD and DST displays will display dashes during VOR and VOR-PAR operation.

ILS APPROACH (Front course and Back course)

1. Programming an ILS approach is accomplished in the same manner as programming conventional VOR.

MISSED APPROACH

1. If the published missed approach utilizes an RNAV waypoint or VOR facility, it may be entered into the memory any time prior to the approach. This is accomplished in the same manner set forth in CONVENTIONAL VOR and RNAV WAYPOINTS in this section.

INFLIGHT

1. Preset waypoints may be recalled from memory and put into active use as required.

FAA Approved
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P/N 60-590001-51

Turn the WPT knob as required to select the desired waypoint. The preset waypoint number, frequency, radial and distance will appear in their respective displays. The WPT display will blink to indicate that the waypoint displayed is other than the active waypoint.

2. Verify that the data is correct.

NOTE

Revisions to the waypoint data can be programmed at this time by entering the new waypoint parameters.

3. When return to the active waypoint is desired press the RTN button. The active waypoint along with its data will be displayed.

4. When navigation to the displayed (blinking WPT) waypoint is desired, press the USE button. The WPT display will cease blinking and the displayed waypoint becomes the active waypoint.

5. The raw VOR & DME data can be checked at any time by pressing the CHK button. The radial from the VOR will be displayed above RAD and the DME distance will be displayed above DST.

RNAV OPERATION

If the system is receiving valid signals from a colocated VOR-DME facility, it will supply linear deviation information to the Horizontal Situation Indicator (or Course Deviation Indicator). Enroute (RNAV) sensitivity, available by turning the MODE selector knob until RNAV is displayed, provides a constant course width of ± 5 NM full scale.

Approach (RNAV-APR) sensitivity, available by turning the MODE selector knob until RNAV-APR is displayed, provides a constant course width of ± 1-1/4 NM full scale. Approach sensitivity should be selected just prior to final approach course interception. Time and distance to the waypoint, and computed groundspeed are displayed on the DME display.

CONVENTIONAL VOR OPERATION

VOR or VOR-PAR modes are selected by turning the MODE selector knob until VOR or VOR-PAR is displayed. In VOR mode the remote DME is automatically tuned when the KNS-81 is selected as the tuning source. Upon lock-on, distance, groundspeed and time to the VORTAC station will be displayed on the DME display. The HSI (CDI) will display conventional angular crosstrack deviation from the selected course (±10° full scale). In VOR-PAR mode, operation is identical to VOR except the HSI (CDI) will display crosstrack deviation of ±5 NM full scale from the selected course. Course width will be constant irrespective of distance from the VORTAC.

Anytime the RAD button is engaged, the radial from the waypoint/station will be displayed on the DME knots display along with an "F" on the DME time to station display.

NOTE

The RAD switch is not the momentary type, therefore, the switch must be pressed again for the normal DME information to be displayed.

ILS OPERATION

Whenever an ILS Frequency is put "IN USE" the mode display will remain the same (either VOR, VOR-PAR, RNAV, RNAV-APR displayed) but the RAD & DST displays will be blanked. Absence of the LOC/GS functions is annunciated by the NAV and GS flags in the HSI (CDI). Only angular deviation is provided in the ILS Mode.

RNAV APPROACH

The RNAV Approach (RNAV-APR) mode may be used for runway location (by placing a waypoint at the approach end of the runway) during an approach to an airport. Turn the MODE selector knob to select RNAV-APR. In RNAV-APR the deviation needle on the HSI (CDI) will display crosstrack deviation of ± 1 1/4 NM full scale. All other aspects of the RNAV-APR mode are identical to the RNAV mode.

PERFORMANCE - No change

WEIGHT AND BALANCE - No change

SYSTEM DESCRIPTION

The King KNS-81 is an integrated navigation system combining a 200-channel VOR/Localizer receiver, a 40-channel glideslope receiver and a digital RNAV computer with a capability of preselection and storage of 9 VOR/LOC frequencies and 9 sets of RNAV waypoint parameters. A DME System must be used in conjunction with the KNS-81.

The KNS-81 can be operated in any one of three basic modes: VOR, RNAV, or ILS. To change from one mode to another the rotary MODE selector knob on the left side of the panel is rotated, except that the ILS Mode is entered automatically whenever an ILS frequency is channeled as the ACTIVE frequency. The display will annunciate the mode by lighting a message beside the WPT display, except in the ILS mode in which case the RAD & DST displays are blanked to denote the ILS mode. In addition to the standard VOR & RNAV enroute (RNAV) modes, the KNS-81 has a constant course width or parallel VOR mode (VOR-PAR) and an RNAV approach mode (RNAV-APR). The same rotary MODE selector knob is used to place the unit in either of these secondary modes.

All waypoint information (station frequency, waypoint distance and waypoint radial) is entered with the increment/decrement rotary switch on the right side of the panel and displayed in their respective displays. The small knob affects the least significant digits while the large knob changes the most significant digits. The tenth's position of waypoint radial and distance can be changed by pulling the small knob to the out position. The type of data being selected is indicated by the illuminated carets (><) located by either FRQ, RAD or DST. Frequency, radial or distance information for a waypoint can be selected sequentially by pressing the DATA push button. The increment/decrement switch changes only the information being displayed with the carets.

The KNS-81 can store frequency, radial and distance information for up to nine waypoints. The waypoint number of the data being displayed is located above the message WPT. This waypoint number is changed by rotating the WPT selector knob (small center knob) on the left side of the panel. If the waypoint in use is different from the displayed Waypoint (WPT blinking), pressing the USE button will cause the displayed WPT to become the waypoint in use.

DISPLAYS

1. FRQ, RAD, DST Display

   a. FRQ Display

      Displays frequency from 108.00 to 117.95 MHz in increments of .05 MHz. Least significant digit displays only zero or five.

   b. RAD Display

      Displays ground station radial on which waypoint is located from 0.0 to 359.9 degrees.

FAA Approved
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P/N 60-590001-51

c. DST Display

Displays the offset distance of the waypoint from the ground station over a range of 0.0 to 199.9 NM.

2. VOR, PAR, RNAV, RNAV-APR Displays

System mode lights

3. WPT Display

Displays waypoint number (1 to 9) of data being displayed.

4. Carets (><) Display

Indicates which waypoint data (FRQ, RAD or DST) the increment/decrement rotary switch will change.

5. DME Indicator (Remote)

Displays NM to/from the waypoint/station, KT ground speed and MIN time to the waypoint/station. Also, the waypoint radial is displayed whenever the KNS-81 RAD Button is pressed.

6. RMI Display (Optional)

Displays the bearing to the waypoint/station.

CONTROLS

1. WPT/MODE Control

Dual concentric knobs.

a. The outer knob selects the MODE of unit operation. Turning the knob clockwise causes the mode to sequence thru VOR, VOR-PAR, RNAV, RNAV-APR and then back to the VOR mode.

b. The center knob selects the WPT to be displayed. Turning the knob causes the displayed waypoint to increment by one thru the waypoint sequence of 1, 2, ... 8, 9, 1.

2. USE Button

Momentary pushbutton which, when pressed, causes the active waypoint to take on the same value as the displayed waypoint.

3. RTN Button

Momentary pushbutton which, when pressed, causes the active waypoint to return to the display.

4. RAD Button

Push-on, push-off button which, when pushed on, causes the radial from the waypoint and "F" to be displayed on the remote DME display.

5. CHK Button

Momentary pushbutton which, when pressed, causes the raw data from the NAV Receiver and DME to be displayed. The radial from the VOR Ground Station will be displayed on the RAD display and the distance from the station will be displayed on the DST display. There is no effect on any other data output.

6. DATA Button

Momentary pushbutton which, when pressed, causes the caret (><) display to change from FRQ to RAD to DST and back to FRQ.

7. OFF/PULL ID Control

ON/OFF/Pull ID Control

Rotary switch/potentiometer which, when turned clockwise, applies power to the KNS-81 and increases NAV audio level. The switch may be pulled out to hear VOR ident.

8. DATA INPUT Control

Dual concentric knobs with the center knob having an "in" and "out" position.

a. Frequency Data

The outer knob varies the 1 MHz and 10 MHz digits and the center knob varies the frequency in .05 MHz increments which carry to/from the .1 MHz digit regardless of whether the switch is in its "in" or "out" position.

b. Radial Data

The outer knob varies the 10 degree digit with a carryover occuring from the tens to hundreds position. The center knob in the "in" position varies the 1 degree digit and in the "out" position varies the 0.1 degree digit.

c. Distance Data

The outer knob varies the 10 NM digit with a carryover occuring from the tens to hundreds place. The center knob in the "in" position varies the 1 NM digit and in the "out" position varies the 0.1 NM digit.

HANDLING, SERVICE AND MAINTENANCE - No change

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for W. H. Schultz
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BEECHCRAFT DUKE B60 LANDPLANES

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT

for the

KING KNR-665A AREA NAVIGATION SYSTEM

GENERAL

The information in this supplement is FAA Approved material, which along with the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual, is applicable to the operation of the airplane when modified by the installation of the King KNR-665A Area Navigation System. The information in this supplement supersedes or adds to that of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. Users of this manual are advised always to refer to the supplement for possibly superseding information and placarding applicable to operation of this airplane.

LIMITATIONS

1. The Area Navigation Function may not be used as a primary system under IFR conditions except on approved approach procedures, approved area navigation airways, and random area navigation routes when approved by Air Traffic Control.

2. The Area Navigation Function can only be used with co-located facilities. (VOR and DME signals originate from same geographical location.)

EMERGENCY PROCEDURES

CAUTION

DME may unlock due to loss of signal with certain combinations of distance from station, altitude, and angle of bank.

1. If NAV flag appears while in the ENROUTE mode, check for correct frequency.

2. If VOR or DME equipment is intermittent or lost, utilize other navigation equipment as required.

3. If NAV flag appears during an approach while in the APPR mode, execute published missed approach and utilize another approved facility.

NORMAL PROCEDURES

The King KNR-665A Area Navigation System is a push-button-tuned navigational unit with a ten waypoint memory capacity. Included is the capability to select the VOR/DME, localizer and glideslope frequencies, electronically "move" the VOR to a phantom location called a Waypoint, and set the navigational course in the Flight Director.

The KNR-665A functions in three modes. In the VOR mode, the unit operates as a conventional VOR converter with a course deviation scale factor of ± 10 degrees presented on the Pictorial Navigation Indicator. This mode is also utilized for localizer/glideslope approaches with a conventional display. Two Area Navigation modes are available. They are designated ENROUTE and APPR for use in enroute and terminal/approach navigation. For Area Navigation, the course deviation is presented in nautical miles on

FAA Approved
Issued: September, 1980
P/N 60-590001-53

the Pictorial Navigation Indicator rather than in degrees as with the VOR mode. This is referred to as "constant course width". The ENROUTE mode provides a constant course width of ± 5 nautical miles (1 nautical mile per 1 dot deviation). APPR mode has a constant course width of ± 1.25 nautical miles (1/4 nautical mile per 1 dot deviation) and should be used when within ten miles of the terminal waypoint.

CONTROL FUNCTIONS

The KNR-665A Area Navigation System is programmed and operated from a panel mounted control unit. Information such as station frequency, course, waypoint radial and waypoint distance is entered into the memory from the keyboard on the control unit. During flight, the desired waypoints are recalled from memory and the modes of operation are selected from the control unit.

1. Mode Switch:

   This three position switch selects conventional VOR/DME operation designated "VOR", enroute Area Navigation designated "ENROUTE", and terminal/approach Area Navigation designated "APPR".

2. 0 thru 9 Keys:

   Each depression of one of these keys enters one digit into the FREQ/KEYBOARD window.

3. FREQ/KEYBOARD Window:

   a. Displays the Waypoint facility frequency when display is constant.

   b. Serves as a "scratch pad" to confirm the input of the keyboard when display is flashing.

4. COURSE Window:

   Displays the selected course in degrees.

5. WPT Radial Window:

   Displays the VOR radial on which the Waypoint is placed.

6. WPT DISTANCE Window:

   Displays the distance along the selected VOR radial on which the Waypoint is placed.

7. Load Keys:

   Load keys are located to the right of the FREQ/KEYBOARD, COURSE, WPT RADIAL and WPT DISTANCE windows. The load keys cause data from the keyboard to be loaded into the respective windows.

8. WPT-CRS-DSPY Window:

   Annunciates the waypoint and course being displayed.

9. WPT-CRS-IN USE Window:

   Annunciates the waypoint and course in use.

10. → Transfer Key:

    Puts the displayed waypoint into use.

11. CRS 1 Key:

    Selects Course 1 (Inbound course).

FAA Approved
Issued: September, 1980
P/N 60-590001-53

12. CRS 2 Key:

    Selects Course 2 (Outbound course).

13. AUTO CRS Key:

    Computes and enters the direct course from present position to the facility. VOR (In VOR mode) or waypoint (In ENROUTE or APPR mode).

14. KYBD CLR Key:

    The Keyboard Clear Key clears the "scratch pad" (FREQ/KEYBOARD window when flashing).

15. NAV TEST Key:

    Initiates an automatic, three-part, sequential self-test. Active in ENROUTE mode only

PREFLIGHT

The preflight check consists of a sequential test of the entire RNAV system, including a test of the computation accuracy of the computer and all displays. The RNAV system will not test with the autopilot engaged or with the navigation receiver tuned to an ILS frequency.

1. Set mode selector switch to ENROUTE.

2. Press and hold NAV TEST key for approximately 15 seconds to initiate three-part self-test.

   Part 1. All lamp segments are illuminated to numeral "8" (except the extreme left digit of FREQ/KEYBOARD window which illuminates to numeral "1").

   Part 2. The airplane is placed over the VOR, the waypoint is located 30.0 miles on the 90.0° radial, the selected course is 30°. The FREQ/KEYBOARD, DSPY, and IN USE windows are extinguished. The Pictorial Navigation Indicator course needle will rotate to 30°.

   Part 3. The course required to fly to the waypoint is computed (90°) and entered into the COURSE window. The Pictorial Navigation Indicator course needle will rotate to 90°.

Failure to satisfy the preflight test requirements indicates an inoperative RNAV computer. Set the mode selector to VOR and use navigational units in conventional VOR/DME operation.

PROGRAMMING

Pertinent information (frequency, course, waypoint radial, waypoint distance, waypoint number) for up to ten waypoints is entered into memory from the panel mounted keyboard unit. Programming the computer may be completed prior to take-off or during the flight. Any combination of navigational facilities (RNAV waypoint, VOR/DME, ILS) may be loaded into the computer; however, it is desirable that each facility be numbered and loaded in the sequence it is to be used.

RNAV WAYPOINTS

1. Select the first waypoint and the inbound course by depressing keyboard number "1" and CRS 1 pushbuttons. These numbers will appear in the top center DSPY window over WPT and CRS.

NOTE

If the navigational facility is at or near the departure point and the first route segment is outbound from that facility, depress keyboard number "1" and CRS 2 pushbuttons.

2. Select the VORTAC frequency by depressing the keyboard buttons in the number sequence. A total of five digits must be entered to complete the frequency input (i.e., frequency 113.8 entered as 113.80). The frequency will appear flashing in the FREQ/KEYBOARD window. Upon confirming the proper frequency has been entered on the keyboard, it is stored into memory by depressing the load key adjacent to the FREQ/KEYBOARD window. The flashing presentation will become steady which confirms frequency storage.

3. Select inbound course to the waypoint on the keyboard. The frequency number in the FREQ/KEYBOARD window will be replaced by the flashing course numbers. Confirm accuracy of course numbers and store into memory with the load key adjacent to the COURSE window. The inbound course number in the FREQ/KEYBOARD window will transfer to the COURSE window and the VORTAC frequency will reappear in the FREQ/KEYBOARD window.

4. Select outbound course from the waypoint by depressing CRS 2 pushbutton. The number 2 will appear in the DSPY window over CRS and adjacent to WPT number 1. Select and load the outbound course value using the same procedure as the inbound course.

5. Select the waypoint radial on the keyboard and enter into memory (after checking) by depressing the load key adjacent to the WPT RADIAL window.

6. Select the waypoint distance following the same procedure as with the selection of the waypoint radial. Enter the value into memory by depressing the load key adjacent to the WPT DISTANCE window.

NOTE

WPT RADIAL and WPT DISTANCE are decimal readouts. Program these values to the nearest tenth unit.

7. This completes the programming for the first waypoint and inbound/outbound courses. Follow these procedures for all selected waypoints up to a maximum of ten.

NOTE

If an error is noted while the value in the FREQ/KEYBOARD window is still flashing, depress the KYBD CLR button and select the correct value on the keyboard. This will not affect any information already stored in the memory. If the error is noted after the value has been loaded, select the proper value on the keyboard, confirm its accuracy in the flashing FREQ/KEYBOARD window, and reload the value into the appropriate window.

CONVENTIONAL VOR

The programming technique for conventional navigation directly toward or away from a VOR facility is similar to that for RNAV waypoints. Inputing the waypoint number, course number, frequency and course values into the memory is accomplished in the same manner. Since the station is not to be electronically "moved" to a new location (waypoint), no values are programmed into the WPT RADIAL and WPT DISTANCE windows.

ILS APPROACH (Front Course and Back Course)

Programming an ILS approach is accomplished in the same manner as programming conventional VOR. However, it is essential that only the inbound front course localizer bearing be entered into the COURSE window for both front course and back course approaches. This will assure that the Pictorial Navigation Indicator and autopilot maintain the proper left/right logic.

MISSED APPROACH

If the published missed approach utilizes an RNAV waypoint or VOR facility, it may be entered into memory anytime prior to the approach. It is recommended that WPT "O" (keyboard numeral 0) be reserved for this operation. Any other waypoint storage (1 thru 9) could be used; however, habitual use of WPT "O" eliminates the possibility of error that could be experienced when selecting an intermediate digit during this critical flight phase.

ENROUTE OPERATION

Prior to take off, select ENROUTE on the mode switch. Flight in this mode is recommended even if navigating directly toward or away from a VORTAC facility. The ENROUTE mode provides the advantages of "constant course width" and smooths the received signals to improve autopilot operation. An exception to this procedure would be caused by the lack of a DME signal co-located with the VOR facility. In this case, the VOR mode would be selected.

1. Place WPT 1/CRS 1 in the DSPY window by depressing keyboard number "1" and CRS 1 pushbuttons. This calls up waypoint 1 information from the memory bank and displays that information in the appropriate windows for checking.

NOTE

At this point, changes to a waypoint parameter may be made by replacing the original numbers with a new entry without affecting the other parameters that are in memory.

2. Depress → (transfer key) to place the displayed information into active use. The waypoint numbers WPT 1/CRS 1 will appear in the IN USE window. This action also automatically tunes the VOR/DME receivers to the appropriate frequencies and causes the course needle on the Pictorial Navigation Indicator to be driven to the displayed course.

3. As the waypoint is approached, recall the outbound course by depressing the CRS 2 pushbutton. This places WPT 1/CRS 2 in the DSPY window. The waypoint information and outbound course are displayed for checking. However, navigation continues on the inbound course. The IN USE window will flash WPT 1/CRS 1 to advise the waypoint and course currently displayed are not in use. Transition to the outbound course is accomplished by depressing the → (transfer key). The displayed waypoint parameters will be placed in use and WPT 1/CRS 2 will appear steady in the IN USE window.

4. Follow these procedures for subsequent waypoints.

AUTOCOURSE OPERATION

The "autocourse" function allows for navigation from the airplane's present location direct to an IN USE waypoint or VORTAC.

1. DIRECT TO WAYPOINT

   Depress AUTO CRS pushbutton. The direct course will be computed and displayed in the COURSE window. The course needle on the Pictorial Navigation Indicator will be driven to the displayed course.

2. DIRECT TO VORTAC

Select VOR on mode switch. Depress AUTO CRS pushbutton. The direct course will be computed and displayed as above. (To obtain the advantages of "constant course width", load 0 nautical miles into the WPT DISTANCE window and return the mode switch to ENROUTE.)

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BEECHCRAFT DUKE B60, KING AIR C90 (LJ-668 THRU LJ-1062, except LJ-670), C90A (LJ-1063 and after) E90, F90, A100, B100, SUPER KING AIR 200, 200C, 200T, 200CT, B200, B200C, B200T AND B200CT LANDPLANES

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT for the FOSTER AIRDATA RNAV 612 AREA NAVIGATION SYSTEM

GENERAL

The information in this supplement is FAA-approved material and must be attached to the Pilot's Operating Handbook and FAA-Approved Airplane Flight Manual when the airplane has been modified by installation of the Foster AirData RNAV-612 Area Navigation System in accordance with Beech-approved data.

The information in this supplement supersedes or adds to the basic Pilot's Operating Handbook and FAA-Approved Airplane Flight Manual only as set forth within this document. Users of the manual are advised always to refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

LIMITATIONS

1. The Area Navigation mode may not be used as a primary system under IFR conditions except on approved approach procedures, approved airways, and random area navigation routes when approved by Air Traffic Control.

2. The Area Navigation mode can only be used with colocated facilities. (VOR and DME signals originate from the same geographical location.)

EMERGENCY PROCEDURES

CAUTION

DME may unlock due to loss of signal with certain combinations of distance from station, altitude and angle of bank.

1. If NAV flag appears while in the enroute mode, check for correct frequency.

2. If VOR or DME equipment is intermittent or lost, utilize other navigation equipment as required.

3. If NAV flag appears during an approach, execute published missed approach and utilize another approved facility.

NORMAL PROCEDURES

ANNUNCIATOR AND DIGITAL DISPLAY SELF-TEST

1. Rotate MODE SELECT knob to VOR/LOC.

2. Press Test Button "T" and hold. Digital display segments will read all 8's. Release Test Button.

3. Press each waypoint button (1 through 4, and AUTO WPT), and release. Each lamp will illuminate briefly.

FAA Approved
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4. Rotate MODE SELECT knob through all positions. Corresponding annunciator lamps will illuminate in each position. In CRS mode, note position of OBS indication and compare with CRS digital display. Push Test Button "T" in CRS mode to display OBS setting to 0.1° resolution.

RNAV SELF-TEST

1. Select RNAV mode. Active waypoint button will be solidly lit.

2. Press Test Button "T" and hold. Active waypoint address will be displayed. BRG and RNG annunciators will be solidly lit.

3. Check for centered needles on proper BRG value with TO flag.

4. Release Test Button "T".

PROGRAMMING

Waypoints 1 through 4 and AUTO WPT function as standard programmable waypoints when manually programmed. AUTO WPT may be programmed for automatic computation of waypoint addresses on either VOR cardinal radials or the airplane's VOR/DME Present Position.

PROGRAMMABLE WAYPOINTS

1. Rotate MODE SELECT knob to RAD/DIST.

2. Press desired waypoint button. Button to be programmed will blink continuously, while waypoint button in use remains solidly lit. RAD annunciator blinks continuously, and DST annunciator is solidly lit.

3. Use DATA knobs to enter desired Radial in left display. Small knob changes "tenths" digit in 0.1° steps. Large knob changes "tens" digit in 10° steps. Overflow from any digit carries over to next digit to left. "Rate Sensing" provides accelerated display changes with rapid knob movements, to speed programming.

4. Press blinking waypoint button again. DST annunciator blinks continuously and RAD annunciator is solidly lit.

5. Use DATA knobs to enter desired Distance in right display. Small knob changes "tenths" digit in 0.1 NM steps. Large knob changes "tens" digit in 10 NM steps. Overflow and rate sensing same as (3).

6. Rotate MODE SELECT knob to FREQ/ELEV.

7. Push the blinking waypoint button again. The FREQ annunciator will commence blinking.

8. Program the NAV receiver to the correct frequency. Rotate the DATA knobs to program the VOR frequency. Display of the three digits left of the decimal point is controlled by the large knob and appears in the left display. The first digit right of the decimal point, and the left most digit in the right display are controlled by the small knob. The last digit displays 0 or 5 only, for 50kHz channel spacing.

9. Push blinking waypoint button again. The ELV annunciator will blink.

10. Program the VOR station MSL elevation (in thousands) in the right hand digit of the right display by rotating the large DATA knob. Waypoint address is now stored.

FAA Approved
Revised: December, 1983
P/N 101-590010-175

NOTE

When reprogramming an active (in use) waypoint, waypoint lamp status will change from solidly lit to blinking. New waypoint information will immediately modify active waypoint address, HSI/CDI display, and autopilot control.

AUTOMATIC WAYPOINTS

1. Set HSI/CDI OBS to desired course between departure and destination points and tune NAV receiver to first reference VORTAC.

2. Rotate MODE SELECT knob to SET (AUTO WPT). AUTO WPT flashes. RAD and DST annunciators are solidly lit.

3. Rotate large DATA knob until desired Cardinal Radial (0°, 90°, 180°, 270°) appears in left display and waypoint distance appears in right display. Note that only Cardinal Radials can be selected.

   If the courseline does not intercept the selected cardinal radial within 299.9 NM of the VORTAC, the right display will show horizontal bars. In this case, the courseline, cardinal radial or VORTAC must be altered.

4. Rotate MODE SELECT knob to RNAV and activate Automatic Waypoint by pressing the AUTO WPT button. Displays will show bearing and Range to Waypoint. BRG and RNG annunciators will be solidly lit. If Auto WPT "DIST" is invalid, displays will be all bars and DST annunciator will blink.

   HSI/CDI steering and autopilot will respond to established courseline, as set by the OBS.

5. Program and activate each new automatic waypoint as the active waypoint is crossed, by tuning the NAV receiver to new VORTAC frequency ahead of the airplane along the established courseline, and repeating steps 2 through 4.

6. As sequential VORTAC stations with differing magnetic variations are selected, modify the OBS setting to maintain the desired track to the destination.

PRESENT POSITION WAYPOINTS

1. Establish airplane in RNAV MODE over desired geographic location.

2. Rotate MODE SELECT knob to RAD/DIST. Press AUTO WPT causing it to blink.

3. Press VOR/DME pushbutton to transfer into memory, the aircraft's Present Position waypoint (radial and distance) relative to selected VORTAC.

CROSSTRACK OFFSET

Crosstrack (XTK) is used to create an RNAV courseline which is parallel to and up to 20 NM either side of the courseline to a waypoint. In the RNAV mode, crosstrack may be programmed simultaneously for all waypoints in memory.

1. Rotate the MODE SELECT knob from RNAV position to CRS/XTK position. XTK annunciator and R annunciator are solidly lit.

2. The small DATA knob controls "tenths" and the large knob controls "units". Rotate knobs clockwise for right crosstrack offset and counterclockwise for left crosstrack offset. L annunciator is solidly lit for left crosstrack settings and R annunciator is off. Displayed crosstrack offset is now stored in memory. L or R and XTK annunciators will flash during entry of new data.

3. Activate pre-programmed XTK in each waypoint by placing the steering mode switch at top of RNAV612 in XTK position. L or R and XTK will be solidly lit when XTK mode is selected.

NOTE

XTK cannot be programmed if mode knob is turned to XTK from VOR/LOC position. XTK can only be programmed when mode knob is turned to XTK position from RNAV mode.

NAVIGATION

RNAV NAVIGATION PROCEDURES

The RNAV612 is in the RNAV mode at all times when the MODE SELECT knob is in the RNAV position, or when it is rotated from the RNAV position to CRS/XTK, RAD/DIST, FREQ/ELEV or SET (AUTO WPT). Digital bearing and distance to the waypoint are continuously displayed (except during programming, self-test or recall of other data), and the BRG and RNG annunciators are solidly lit.

The RNAV provides left/right steering, flag and to/from signals to the HSI/CDI. RMI steering and flag signals are optional. The steering method (Enroute, Approach, Crosstrack) is determined by the position of the steering selector switch.

WAYPOINT ADDRESS DISPLAY

Any active or inactive waypoint address (radial and distance) may be recalled and digitally displayed. The RAD and DST annunciators will be solidly lit during recall and display.

ACTIVE WAYPOINT

With MODE SELECT knob in RNAV position, press and hold the active waypoint button to display its address.

2. In the RNAV mode, with the MODE SELECT knob in RAD/DIST position, the active waypoint address is automatically displayed.

INACTIVE WAYPOINTS

1. With the MODE SELECT knob in the RAD/DIST position, inactive waypoint addresses may be displayed by pressing the desired waypoint pushbutton. Returning to the RNAV mode will restore the active waypoint BRG/RNG display.

2. With the MODE SELECT knob in the VOR/LOC or CRS/XTK position, press and hold any inactive waypoint button to display its address radial and distance in the left and right digital displays.

GROUNDSPEED/TIME-TO-WAYPOINT DISPLAY

In the RNAV mode, press and hold the KTS/MIN button. The left digital display will show groundspeed (knots) to the waypoint. The right digital display will show time (minutes) to the waypoint. The KTS and MIN annunciators will be solidly lit.

RNAV groundspeed computation will normally be valid after 15 miles of flight toward a waypoint. When orbiting a waypoint, groundspeed of 60 KTS or less will not be displayed.

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PRESENT POSITION DISPLAY

PRESENT POSITION is commonly used to identify the exact airplane position relative to the VORTAC while flying computed RNAV routes.

With the MODE SELECT knob in any position except OFF, press and hold the VOR/DME button. The left digital display will show the radial from the VOR to the airplane position. If the station is a VORTAC, the right digital display will show airplane distance from the VORTAC along this radial. The VOR and RAD (VOR Radial) and DME annunciators will be solidly lit.

HSI/CDI OBS SETTING AND CROSSTRACK OFFSET DISPLAY

In the RNAV mode, rotate the MODE SELECT knob to the CRS/XTK position. The left digital display shows CDI/HSI OBS setting and the CRS annunciator will be solidly lit.

Rotation of the OBS knob will cause a corresponding change in the digital CRS display. This feature can be used to reduce pilot setting error when selecting a course.

NOTE

To obtain 0.1° course OBS resolution, push Test Button "T".

While in this mode, the right digital display shows any crosstrack offset programmed for the active waypoint, and the XTK and R or L annunciators will be solidly lit.

VOR/LOC OPERATION

The RNAV612 is in either the VOR or Localizer mode at all times when the MODE SELECT knob is in the VOR/LOC position, or when it is rotated from the VOR/LOC position to CRS/XTK.

When the RNAV612 is in the VOR/LOC mode and the NAV receiver is channeled to a VORTAC station, the digital displays show VOR bearing and DME distance TO the station. The VOR and DME annunciators will be solidly lit.

When the localizer receiver is used (Localizer mode), the left display will show dashes and annunciators will be off. The RNAV612 displays continuous digital distance to the terminal DME in the right display, and the DME annunciator will be solidly lit.

If there is no terminal DME, the right display will also show dashes and the DME annunciator will be off.

HSI/CDI OBS SETTING DISPLAY

In the VOR/LOC mode, rotate the MODE SELECT knob to CRS/XTK. The left digital display will show the CDI/HSI OBS setting and the CRS annunciator will be solidly lit. The right digital display will be blank, indicating XTK is neither operational nor programmable in the VOR/LOC mode.

NOTE

To obtain 0.1° CRS display resolution, push Test Button "T" while in CRS mode.

GROUNDSPEED/TIME-TO-VORTAC DISPLAY

In the VOR/LOC mode, press and hold the KTS/MIN button. The left digital display will show groundspeed

(knots) to the station. The right digital display will show time (minutes) to the VORTAC. The KTS and MIN annunciators will be solidly lit.

PRESENT POSITION DISPLAY

With the MODE SELECT knob in the VOR/LOC or CRS/XTK position, press and hold the VOR/DME button. The left digital display will show the radial from the VOR to the airplane position. If this station is a VORTAC, the right digital display will show the airplane distance from the VORTAC along this radial. The VOR and RAD (VOR Radial) and DME annunciators will be solidly lit.

RNAV STEERING

RNAV612 provides linear (constant course width) HSI/CDI steering information in the RNAV mode, with Enroute (ENR), Approach (APP) or Crosstrack (XTK) steering.

ENROUTE (ENR)

With the RNAV612 steering selector in the Enroute (ENR) position, full scale course width is a constant ±5 NM.

APPROACH (APR)

The RNAV612 steering selector may be moved to the Approach (APR) position for increased HSI/CDI steering resolution. Full scale course width is ±1.25 NM.

Approach mode steering sensitivity should be used only on RNAV instrument approaches inside the Final Approach Fix.

CROSSTRACK (XTK)

The RNAV612 may be programmed to establish a parallel courseline up to 20 NM either side of an RNAV course. When Crosstrack (XTK) steering has been selected, the HSI/CDI needle will center when the aircraft is on the programmed parallel offset course. As with enroute steering, full scale HSI/CDI needle deflection is ±5 NM.

VOR/LOC STEERING

When a VOR station has been selected in the VOR/LOC mode, HSI/CDI steering will be based on conventional ±10° full scale track angle deviation from the selected courseline. The HSI/CDI needle will center when the aircraft is on the courseline set into the OBS. When the localizer has been selected, HSI/CDI needle sensitivity will assume standard localizer course width characteristics.

DIGITAL STEERING

The RNAV612 has fully digital navigation steering capability in both the RNAV and VOR modes, including left/right steering and range to waypoint or DME distance to the VORTAC. The RNAV612 digital steering is a viable and precise method of navigation, and can also be employed as a backup to the HSI/CDI.

Digital steering follows the same rule as ADF steering. When inbound TO a waypoint or VOR, fly right to reduce the displayed bearing and left to increase it.

APPROACH RANGE MONITOR

The Approach Range Monitor feature provides for the separation of the RNAV computed range to a

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waypoint from the steering guidance of the pilot's horizontal situation indicator. Selecting the Approach Range Monitor switch to the RANGE MONITOR position will connect the RNAV computer to the NAV 2 receiver. The pilot's horizontal situation indicator will be retained on the NAV 1 receiver.

On an ILS approach, for example, it is desirable to know distance to the outer marker and then to the runway threshold. By selecting RANGE MONITOR and setting the appropriate NAV 2 frequency and waypoint parameters, the distance to the desired fix will be continuously displayed while ILS steering guidance on the horizontal situation indicator will be conventional. The result is the ability to fly a localizer or full ILS steering situation while retaining RNAV computed distance to a selected fix.

CAUTION

It is imperative the Approach Range Monitor switch be placed in the NORMAL position during RNAV operations. If left in the RANGE MONITOR position, the range display will be based on the NAV 2 frequency, and the pilots horizontal situation indicator will display conventional VOR steering based on the selected NAV 1 frequency.

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BEECHCRAFT DUKE 60 (P-3 thru P-126 except P-123), A60 (P-123, P-127 thru P-246) AND B60 (P-247 thru P-307) LANDPLANES FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT for the AIRESEARCH PRESSURIZATION SYSTEM (KIT 60-5024)

GENERAL

The information in this supplement is FAA-approved material and must be attached to the Pilot's Operating Handbook and FAA-Approved Airplane Flight Manual when the airplane has been modified by installation of the AiResearch Pressurization system (Kit 60-5024) in accordance with Beech-approved data.

The information in this supplement supersedes or adds to the basic Pilot's Operating Handbook and FAA-Approved Airplane Flight Manual only as set forth within this document. Users of the manual are advised always to refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

LIMITATIONS - No change

EMERGENCY PROCEDURES - No change

NORMAL PROCEDURES

ENVIRONMENTAL CONTROLS

PRESSURIZATION SYSTEM

BEFORE TAKE-OFF, CONTROLLER

1. Pressurization Air Shut-Off Controls - OPEN (In)
2. Test/Dump Switch - NOR
3. Cabin Altitude Controller - SET OUTER SCALE 1000 FEET BELOW FIELD ELEVATION
4. Throttles - 2500 RPM
5. Test/Dump Switch - HOLD TO TEST (Note momentary cabin descent); RELEASE TO NOR POSITION
6. Cabin Altitude Controller - SET OUTER SCALE TO DESIRED CABIN ALTITUDE OR INNER SCALE TO CRUISE ALTITUDE PLUS 500 FEET
7. Rate Control - SET POINTER TO VERTICAL POSITION

IN FLIGHT (Before Descent), CONTROLLER

1. Cabin Altitude Controller - SET OUTER SCALE TO FIELD ELEVATION PLUS 500 FEET
2. Rate Control - SET TO ACHIEVE ZERO PRESSURE DIFFERENTIAL BEFORE LANDING

NOTE

During descent, adjust power as required to maintain pressurization.

PERFORMANCE - No change

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WEIGHT AND BALANCE - No change

SYSTEMS DESCRIPTION

ENVIRONMENTAL SYSTEMS

PRESSURIZATION

CABIN ALTITUDE CONTROLLER

The controller contains a visual display of the selected altitude, an altitude selector, and a rate control. The altitude outer scale indicates the selected cabin altitude and the inner scale indicates the corresponding airplane altitude where the maximum differential pressure would occur.

Before take-off, the altitude may be set either to the desired cabin altitude (outer scale) or to the planned cruising altitude (inner scale) plus 500 feet. Before descent to landing, the outer scale should be set to the field elevation plus 500 feet.

The rate control regulates the rate at which cabin pressure ascends or descends to the selected altitude. The pointer set to the vertical position results in a rate of approximately 500 ft/min.

If the cabin differential pressure reaches the maximum and the airplane is still climbing, the cabin altitude will climb with the airplane altitude.

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