

## INTRODUCTION

The Edo-Aire Mitchell Century IIB is a light weight automatic flight system utilizing an advanced electronic design for maximum performance and utility. Operating on the versatile 5000 cycle audio frequency, the Century IIB represents a design concept, pioneered by Edo-Aire Mitchell, in which the conventional follow-up or control position feedback signals are replaced by solid state analytical computers. In addition to providing a more stable and adaptable platform, the new system can cope with uneven fuel loads and directional mistrim without the usual directional errors.

Roll responses are time controlled for human-like control action and smooth heading changes.

This manual describes the basic characteristics of each function and its relationship to other functions in the flight system. Maximum utility will be realized after familiarization and practice.

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## COMMAND CONSOLE

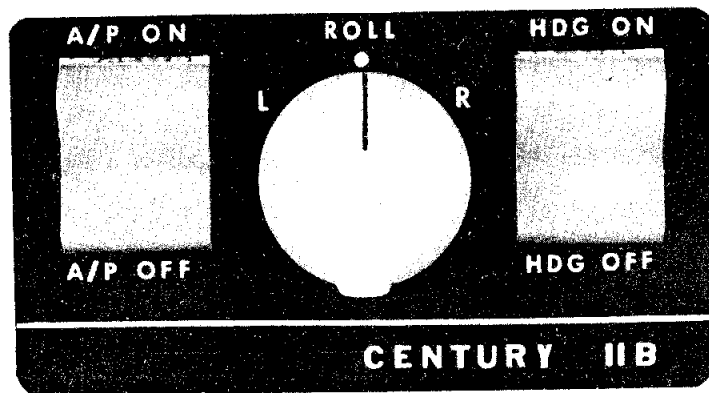


FIG. 1

The Century IIB Console is designed to provide convenient finger tip command of the basic roll and heading functions. The lucite panel incorporates optically engineered night lighting with provisions for dimming control through the standard aircraft rheostat.

## ROLL (AILERON) ENGAGEMENT

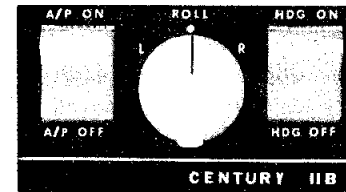


FIG. 2

The Century IIB incorporates a fail safe electrical engage and disengage mechanism in the roll servo which is operated by the A/P ON-OFF Rocker Switch in the console. When only this switch is engaged, the autopilot is responsive to the roll command knob on the center console.

## ROLL COMMAND KNOB

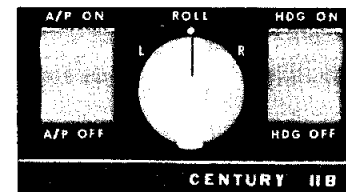


FIG. 3

The roll command knob may be used to maneuver the aircraft up to approximately 30° of bank right or left. The centered position represents approximate wings level flight. When the Heading mode switch is engaged the roll knob is removed from the autopilot circuit and is ineffective.

## HEADING MODE

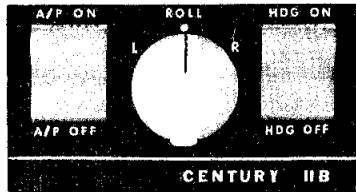
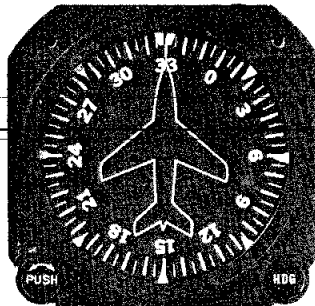


FIG. 4  
The heading mode rocker switch is used when turning the aircraft to a preselected heading on the Course Selector D. G. or when conducting course intercepts or tracking. Activating this switch removes the roll command knob from the autopilot circuit and adds the D. G. heading and coupler functions as basic autopilot inputs. The Course Selector D. G. and coupler mode selector should be set prior to engagement of the heading mode. (See Section on Coupler Operations when optional coupler is installed).

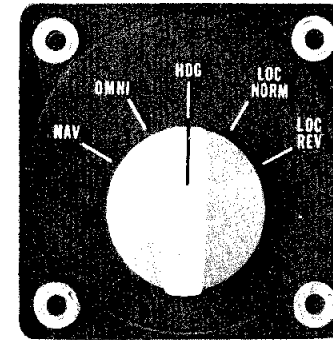
## COURSE SELECTOR D. G.



Caging Knob      Heading Knob  
Course Selector Indicator

FIG. 5  
The course selector D. G. replaces the standard directional gyro and provides a fully visible, 360° course indication. The D. G. dial is marked in 5° intervals and numbered each 30° around its azimuth. A center indice is provided at the top to align selected headings. Additional indices are located each 45° to facilitate rapid turn selection without mental arithmetic. Any heading may be selected, either before or after engagement, and turns up to 160° may be programmed directly, either right or left. If the course selector indicator is rotated beyond 180° from the D. G. card heading, the autopilot will turn in the shortest direction to reach the selected heading. In normal operation the maximum bank in HDG mode is 20°. The D. G. card is set with the caging knob on the left of the instrument and the course selector indicator is rotated by the hdg. knob on the right. Direction of response to rotation for both knobs is conventional.

## LATERAL GUIDANCE SYSTEM



COUPLER MODE SELECTOR

FIG. 6

The Edo-Aire Mitchell Lateral Guidance System contains a completely automatic, analog computer that directs the autopilot in both VOR and ILS navigation. The system contains a five position coupler mode selector switch which mounts in the instrument panel. Nominal interception angles are 45° and an automatic 15° crosswind correction capability is provided. The complete capture, intercept and tracking sequence is accomplished automatically without monitoring or multiple switching.

### OMNI MODE

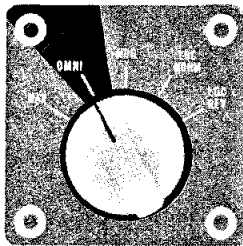


FIG. 7

When in the OMNI MODE position, the system is coupled to the Omni Bearing Indicator. To select a desired course for interceptor tracking, always set both the Omni Course Selector and the D. G. Course Indicator to the desired course. All headings will then be controlled by the Omni radio signals. A full deflection on the Omni Indicator will produce a 45° interception angle. With less than full deflection, the system will automatically direct a smooth, tangential intercept to arrive over the radial with crosswind correction established. The same dynamic intercept is accomplished whether 2 miles or maximum reception distance from station. Below approximately 2 miles autopilot bank limitations will allow a slight overshoot of the selected radial.

### NAV MODE

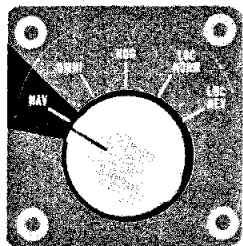


FIG. 8

NAV Mode operation is initiated in the same manner and serves the same functions as Omni Mode. The NAV Mode, however, incorporates an extended time delay in the computer circuitry which reduces reaction to short term needle deflections. The NAV Mode is recommended for enroute navigation or anytime autopilot response to short term needle deflections becomes excessive. The NAV Mode should not be used for close in VOR approach work, as close in work requires the proportioned dynamic response provided by the Omni Mode.

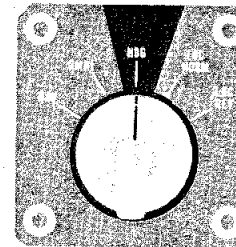


FIG. 9

### HEADING MODE

When in the HDG mode the Century IIB Autopilot will function as described on pages 4 and 5 of this manual.

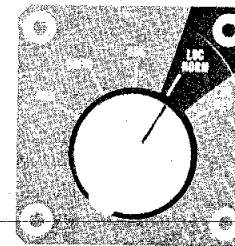


FIG. 10

### LOCALIZER (Normal) MODE

In the LOC Norm mode, the system adjusts its sensitivity to accommodate the 5° localizer course width. Since the localizer course width is only 1/4 as wide as the nominal omni indication, additional damping circuits are included to produce smoother, more optimum intercept and track maneuvers. Intercept angles of 45° are automatic with tangential intercepts outside the

outer marker and automatic crosswind correction. As with the Omni Mode, the Course Selector D. G. must be set to correspond with the desired magnetic course.

### LOCALIZER (Reverse) MODE

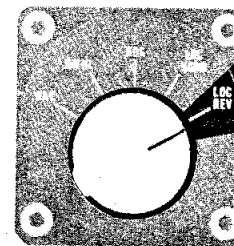


FIG. 11

The Edo-Aire Mitchell Lateral Guidance System is equipped with the Localizer Reverse feature to permit automatic back course approaches and to allow outbound tracking on the Front Course prior to procedure turn. The features of LOC-REV are identical to the LOC-NORM except that the aircraft will fly away from the Localizer Indicator Needle instead of toward it. When using the LOC-REV mode, the Course Selector Indicator must be set to the reciprocal of the Front Course heading.

## GENERAL OPERATIONS

The Century IIB and optional coupler are FAA approved on each make and model aircraft under a "Supplemental Type Certificate" S.T.C.

There are no restrictions to operations in turbulence and as a general rule, autopilot operation in turbulence will result in smoother operation.

Autopilot operating limitations and any special limitations will be specified on the Limitations Placard or in the Airplane Flight Manual Supplement. This should be carefully read and understood.

Autopilot override forces are adjusted to the servo power output requirements of each particular aircraft. The autopilot may be overridden by the pilot without damage to the system.

NOTE: Only Edo-Aire Mitchell trained specialists at approved service centers should adjust servo torque outputs.

## PILOT'S PREFLIGHT PROCEDURE

1. With engines running and gyros erected, check vacuum readings. Should be 4.75" to 5.00" HG.
2. With the autopilot off, place coupler mode selector on hdg. position. Center roll knob and D. G. course selector indicator.
3. Engage roll switch, rotate roll command knob left and right and note that the control wheel responds in the proper direction.
4. Engage heading mode switch and rotate course selector indicator to either side. Note roll servo response; again, without aerodynamic response, servo action is unlimited.
5. Override the autopilot at the control wheel in both directions. Force required should be approximately 15 lbs. at wheel edge dependent upon aircraft model.
6. Disengage autopilot before takeoff.

## AUTOPILOT ENGAGE SEQUENCE (IN FLIGHT)

1. Trim aircraft to a wings level flight attitude.
2. Center roll knob and engage autopilot "ON" switch.
3. If navigation mode selector is installed select "HDG" mode.
4. Center D. G. course selector indicator and engage heading mode switch.

## LATERAL GUIDANCE SYSTEM OPERATION

Perform Steps 1 - 4 above then continue below:

5. Match course selector indicator to selected VOR or ILS course.
6. Select Lateral Guidance Mode desired.

VOR NAVIGATION (See Fig. 12)

1. TO INTERCEPT

- A. Using Omni Bearing Selector (OBS) dial desired course, inbound or outbound.
- B. Set identical heading on Course Selector D. G.
- C. After aircraft has stabilized, position coupler mode selector knob to OMNI mode.

NOTE

If aircraft is positioned less than  $45^\circ$  from selected radial, aircraft will intercept before station. If more than  $45^\circ$ , interception will occur after station passage.

- D. As aircraft nears selected radial, interception and crosswind correction will be automatically accomplished without further switching.
- E. As the aircraft nears the OMNI station, ( $\frac{1}{2}$  mile) the zone of confusion will direct an "S" turn in alternate directions as the OMNI indicator needle swings. This alternate banking, is an indication that station passage is imminent.

2. TO SELECT NEW COURSE

- A. To select any outbound course or radial, dial the new course into the Course Selector D. G.
- B. Rotate OBS to the same course.
- C. Aircraft will automatically turn, to the interception heading for the new course.

3. TO CHANGE STATIONS

- A. If same course is desired, merely tune receiver to new station frequency.
- B. If different course is desired, position coupler mode selector to HDG mode.
- C. Dial Course Selector D. G. to new course.
- D. Dial OBS to new course.
- E. Position mode selector to OMNI mode.

VOR NAVIGATION

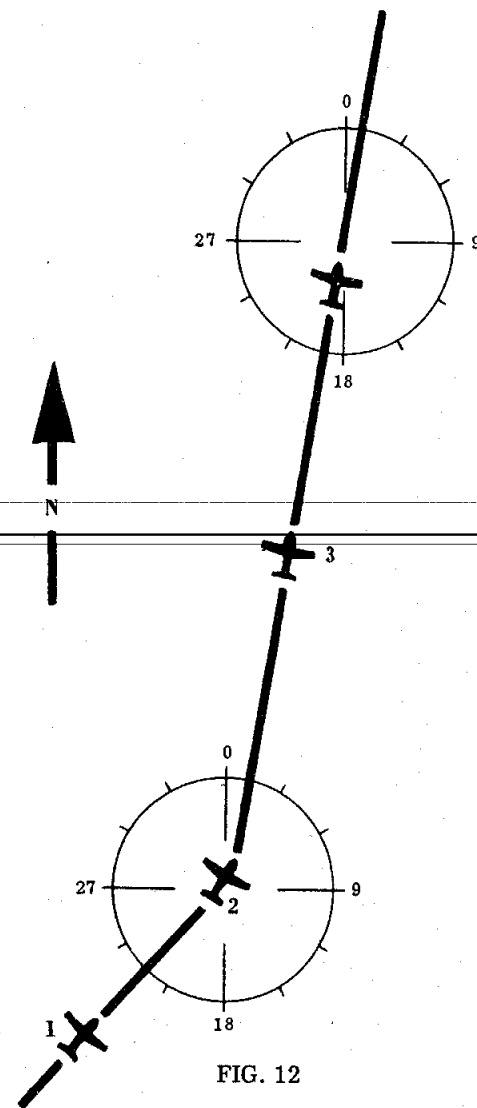


FIG. 12

VOR APPROACH (See Fig. 13)

1. Track inbound to station as described in VOR Navigation Section.
2. At station passage dial outbound course on Course Selector D. G. and on OBS.
3. After established on outbound radial, position position coupler mode selector to HDG mode and select outbound procedure turn heading.
4. To turn inbound, dial inbound procedure turn heading on Course Selector D. G. dialing in desired direction of turn. Set OBS to inbound course.
5. When turned to within 90° of inbound course, dial Course Selector Indicator to inbound course and position coupler mode selector to OMNI mode.
6. If holding pattern is desired, position mode selector to HDG mode at station passage inbound and select outbound heading in direction of turn.
7. To turn inbound, dial inbound course on Course Selector inbound.
8. When turned to within 90° of inbound radial, position coupler mode selector on OMNI mode.

NOTE

For precise tracking over Omni Station, without "S" turn, position coupler mode selector on HDG until station passage.

VOR APPROACH

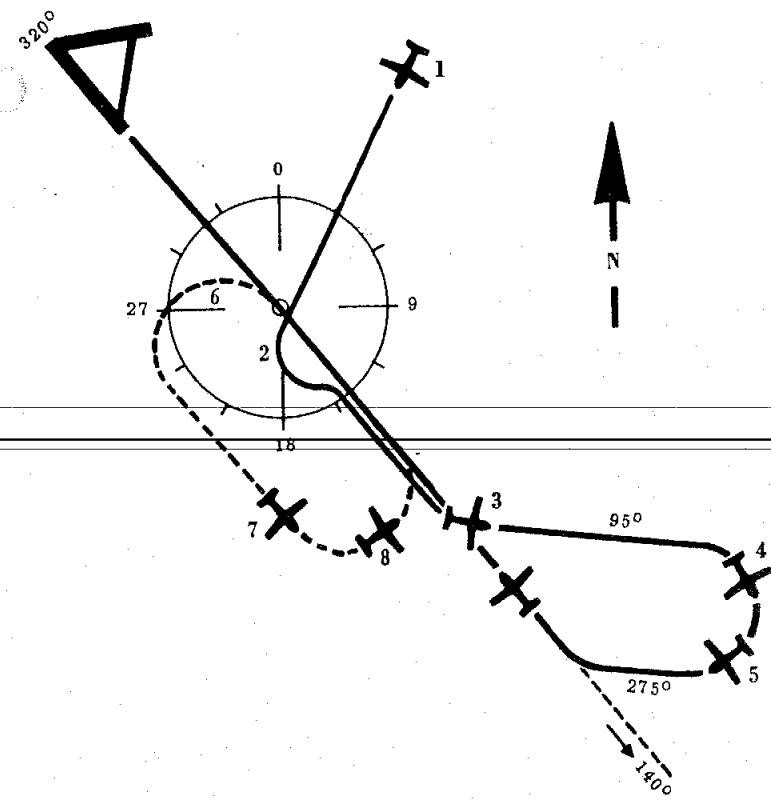


FIG. 13

ILS APPROACH--BACK COURSE (See Fig. 15)

1. To Intercept Back Course Outbound:
  - A. Dial ILS Front Course heading on Course Selector D. G.
  - B. When stabilized, position mode selector to LOC NORM mode.
2. For Procedure Turn:
  - A. After interception and when beyond final approach fix, position mode selector to HDG and dial outbound procedure turn heading.
  - B. To turn inbound, dial inbound procedure turn heading in direction of turn.
3. When within 90° of inbound course, dial inbound course on Course Selector D. G. and position mode selector on LOC REV mode.
4. Position mode selector to HDG mode to prevent "S" turn over ILS station near runway threshold.
5. Execute missed approach procedure.

ILS APPROACH-BACK COURSE

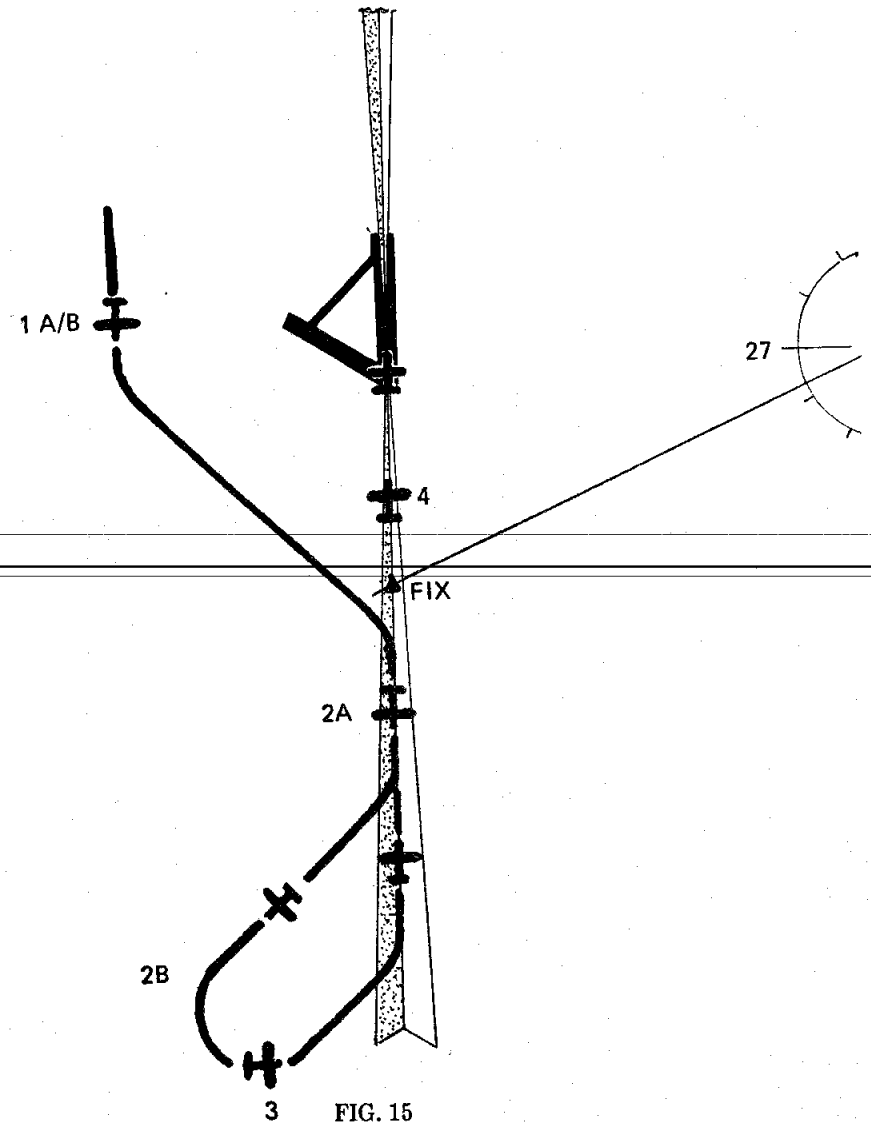
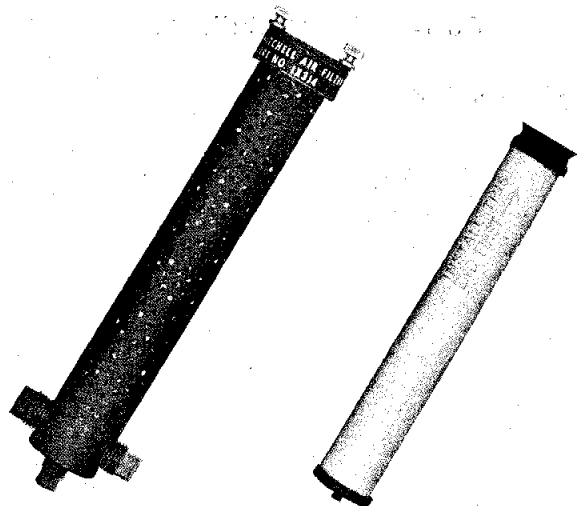


FIG. 15



AIR FILTER



NOTES

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AIR FILTER AND ELEMENT

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The Edo-Aire Mitchell 1X314 central air filter is incorporated on all 3" gyro systems with the exception of aircraft with original equipment filters of like quality.

The 1X314 filter system uses the 51A5 replaceable filter element which is capable of removing 97% of all contaminating substances above 3 microns. This includes tobacco tars that would otherwise be harmful to bearings and vanes. Because of this exceptional filtering ability contaminants tend to accumulate at a higher rate than in other types. It is therefore considered necessary that filter elements be replaced at each 100 hour period and that filters subjected to tobacco tars, industrial smoke and like environment, be inspected each 50 hours for possible replacement

Gyro warranty is dependent upon following this procedure.