

Dynon D180 FlightDEK Reference Manual



This manual contains information for the use of the Dynon D180 FlightDEK as configured for Jabiru 24-7886.

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1 Important Note

The Dynon D180 FlightDEK is an instrument that is configurable for many different aircraft and engine types. It is also capable of managing inputs from a variety of optional sensors.

Whilst this aircraft has had the EFIS customised on installation, it is still possible for a user to actively or inadvertently alter many of the settings. Care must be taken to avoid this. At best, another pilot may not be able to access key information, and at worst, may result in the aircraft being inoperable until we can engage a professional to reset the EFIS at our cost.

Please report immediately if you think that some aspect of the EFIS operation does not meet the directions given in this guide.

2 Definitions

- EFIS Electronic Flight Information System
- EMS Engine Management System
- HSI Horizontal Situation Indicator

3 Overview & Basic Operation

It is essential that all pilots of 7886 are familiar with the overview and basic operation of the D180. Operation of advanced features, and the Auto-pilot, are only required for pilots wishing to utilise these features.

3.1 Power

The D180 will power up when the master switch is turned on. It is acceptable to have the D180 on during engine crank.

Power On – Press button 1.

Power Off – Press and hold button 1 until the display turns off.

3.2 Front Panel Layout



The display is set up to provide all necessary flight information.

The buttons are used to turn the instrument on and off, cycle between screens, scroll through menus, and adjust instrument parameters

3.3 Screens and Pages



Screens contain one or two pages and pages contain groups of similar information.

A page is a section of the screen that contains a collection of related data. Pages share the screen with other pages (2/3, 1/3 split).

3.4 Cycling Screens

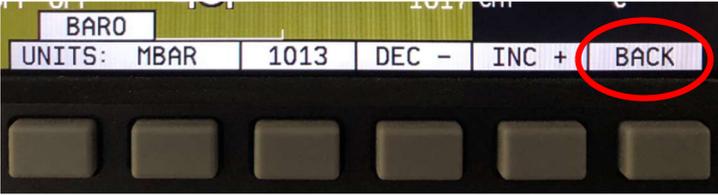
	<p>Buttons 1 and 6 cycle to the previous and next screens, respectively.</p>
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3.5 Menus

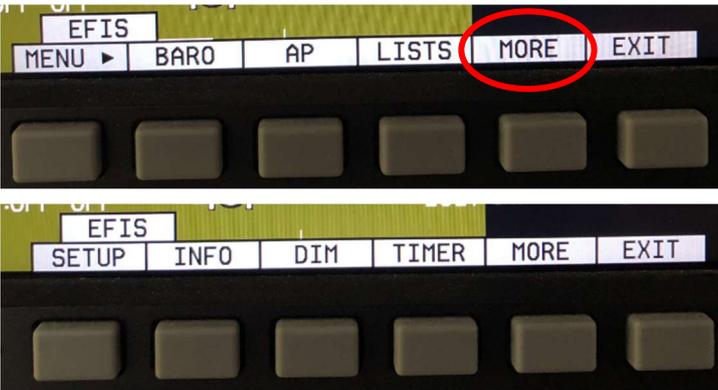
	<p>On a screen where no menu is already present, buttons two through five are used to display a menu.</p> <p>All of the default screens are divided into two pages with the left page occupying 2/3 of the screen and the right page occupying 1/3 of the screen.</p> <p>Pressing buttons two, three, or four (all below the left 2/3 of the screen) displays the main menu for the left page and pressing button five (below the right 1/3 of the screen) displays the main menu for the right page.</p>
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3.6 Menu Functionality

	<p>A menu consists of two rows of gray boxes containing text. The upper row contains one tab that denotes the currently displayed menu. The lower row contains six labels that denote the function of the button below it. Many of the onscreen elements move up to avoid the menu. This prevents the menu from obscuring useful data while it is up. Upon exiting the menu, the screen returns to its normal appearance.</p> <p>Pressing a button either displays another menu or adjusts a parameter. If there is no text above a button, then that button does not have a function in the context of that menu. Occasionally, a button label spans</p>
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	<p>two or more buttons. In this case, any button below the label invokes the command.</p> <p>If a menu contains more options than there are buttons, the MORE label is displayed over button five. Pressing this button shows you the next set of options in the current menu.</p>
	<p>In any menu, press the BACK button to return to the previous menu and save any changes. In all top-level menus, button six is the EXIT button. Pressing EXIT removes the menu system and moves many of the onscreen elements down to their original positions.</p>

3.7 Menu Flows

	<p>Each page has its own main menu, which may contain options for navigating to other menus or choosing and adjusting parameters.</p> <p>For example, the EFIS Main Page menu contains an EFIS menu tab and button labels for MENU►, BARO, AP, LISTS, MORE, and EXIT.</p> <p>Pressing MORE reveals the rest of the EFIS menu. This menu contains options for SETUP, INFO, DIM, TIMER, MORE, and EXIT. Pressing MORE on this menu simply returns you to the first part of the EFIS menu.</p>
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3.8 Alerts

3.8.1 Alarm Indicators

Any time a built-in or preconfigured alarm set point is exceeded, you are alerted via visible alarms.

- When an alarm is triggered, the following things occur:
- The measurement's value and tick color are highlighted red
- The measurement's value and tick blink
- A red alarm bar appears at the bottom of the screen with a message identifying the out of range measurement
- Below the alarm bar, the alarm menu gives you options for what to do next. See the following subsections for more information

NOTE:

No audio alert output is fitted to this aircraft so you will not hear an audible alarm.

3.8.2 SHOW PAGE

If the alarming measurement is not displayed on your current screen, or is available on a page which displays it better, a SHOW [PAGE] button is included in the alarm menu. [PAGE] is replaced with the name of the actual page that is displayed when you press the button. Press this button to display the page where the alarming measurement is best displayed. From there, you may press GO BACK to

return to your original screen, leaving the alarm indications active, or press ACK to remove the alarm and return to your original screen.

3.8.3 ALARM SILENCING

As this aircraft is not fitted with an audible alarm, pressing the SILNCE button has no function.

3.8.4 ALARM ACKNOWLEDGE

To acknowledge the alarm, press the ACK button. The ACK button has a number next to it indicating the number of currently posted alarms. If this number is higher than 1, after you press ACK the alarm text for the next posted alarm is displayed in the alarm bar. Pressing ACK does the following:

- Removes the alarm bar and alarm menu (if no other alarms are stacked up), and brings up the previous menu.
- Stops the blinking of the relevant display
- Returns the display to the screen configuration displayed before the alarm occurred (if you pressed SHOW [PAGE])

The tic and numeric value remain red until the condition no longer exists. The alarm automatically rearms whenever the alarm condition is removed.

3.8.5 Latching and Self-clearing Alarms

Alarms may be set to be latching, while others may be self-clearing.

LATCHING ALARMS

If an alarm occurs on a sensor that is latching, the alert displays on screen until the ACK button is pressed, *even if the alarm condition goes away*. This means if, for example, your oil pressure momentarily gets too high but returns to normal, the instrument continues to alarm on the condition until that alarm is acknowledged. Latching alarms let you to know if an alarm happened momentarily, when you might have otherwise missed it.

SELF-CLEARING ALARMS

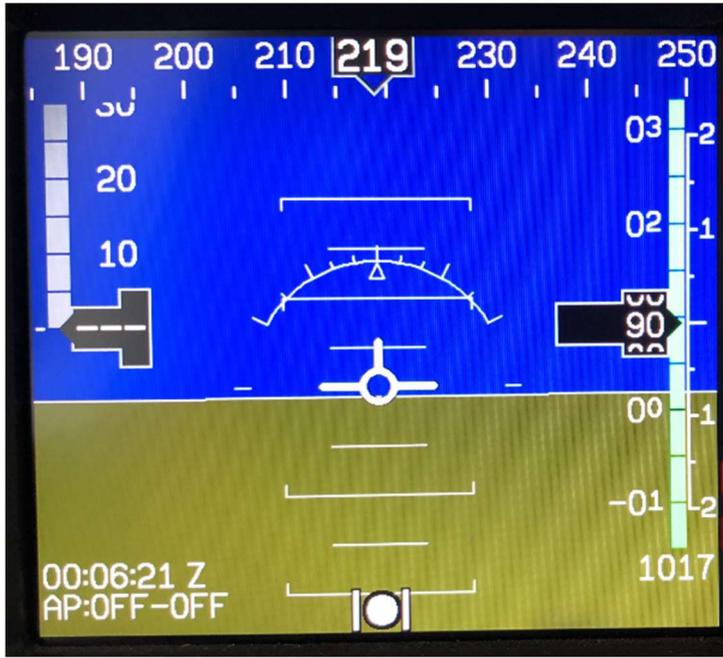
If an alarm occurs on a sensor configured to be self-clearing, the alert displays on screen until either the ACK button is pressed *or* the alarm condition goes away. Consider the example where a fuel pressure alarm to be self-clearing. If the engine's fuel pressure momentarily rises too high but then returns to normal, the D180 alarms for that brief instant, but stops as soon as the alarming condition has ceased; no acknowledgement is needed.

4 Screens

The screens available in rotation are:

1. EFIS / EMS (boot-up screen)
2. EFIS / AUX
3. EFIS / FUEL
4. EFIS / TIMES
5. EFIS / HSI

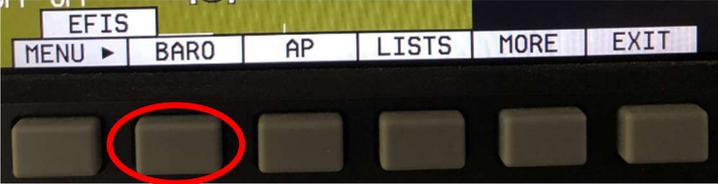
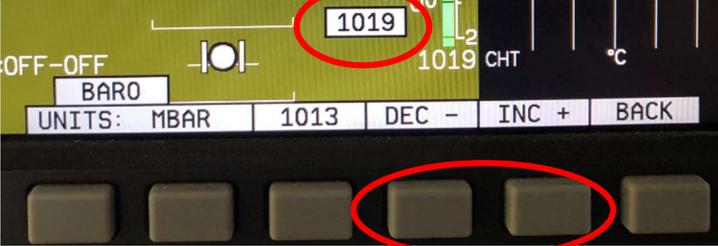
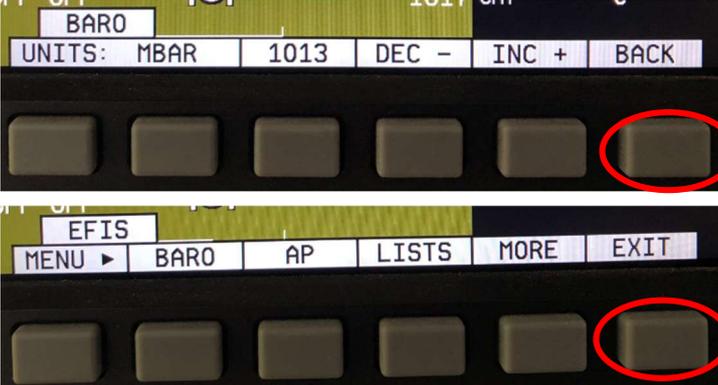
4.1 EFIS Main Page

 <p>The screenshot shows a simulated cockpit instrument display. At the top, a heading scale ranges from 190 to 250 degrees, with a digital readout of 219. Below this is a pitch and roll indicator showing a white aircraft symbol. To the left, an airspeed indicator shows a scale from 0 to 250, with a digital readout of 90. To the right, an altitude indicator shows a scale from 00 to 03, with a digital readout of 1017. At the bottom left, the time is 00:06:21 Z and autopilot status is AP:OFF-OFF.</p>	<p>The EFIS screen contains the following:</p> <ul style="list-style-type: none"> • Horizon line, pitch and roll indicators (brown/blue at centre of screen) • Heading tape, digital readout and turn rate indicator (top) • Altitude tape, digital readout, and VSI (right) • Airspeed tape, digital readout, and trend (left) • Bugs • Slip/skid ball • Clock (Z indicates Zulu time) • Autopilot Status Indicator • Altimeter barometer setting (bottom right)
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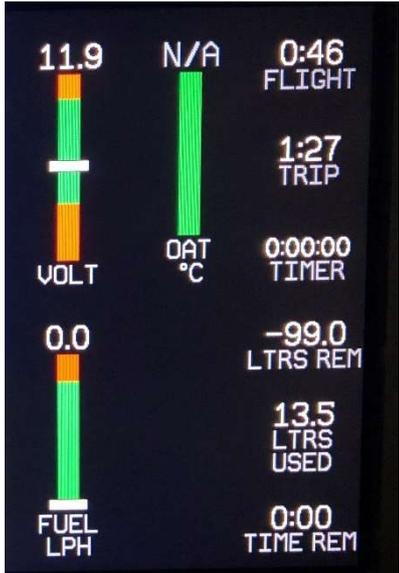
4.1.1 EFIS Voltmeter

 <p>The screenshot shows a digital display with three rows of text. The first row is 'M 04.0V', the second is 'E 00.0V', and the third is 'I 00.0V'. The background is dark blue with white text.</p>	<p>The voltmeter displays 3 rows of information corresponding to the three power inputs:</p> <ul style="list-style-type: none"> M – Master switch voltage E – External backup voltage I – Internal battery voltage <p>An alert will be displayed when the internal battery is low.</p>
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4.1.2 BARO – Changing Altimeter Setting

	<p>Set the primary altimeter to the correct altitude (eg 110ft at YREN).</p>
	<p>Take the pressure reading from the altimeter.</p>
	<p>Select the EFIS BARO option</p>
	<p>When the BARO menu is displayed, the value-setting box shows the current altimeter setting. The DEC- and INC+ buttons change the altimeter setting by 1 mbar.</p>
	<p>Press BACK and then EXIT to exit the EFIS menu.</p>
	<p>The atmospheric pressure reading is displayed in the lower right of the screen.</p> <p>NOTE: The altimeter reading may take a little time to stabilise after being adjusted.</p>

4.2 AUX Page

 <p>The screenshot shows the AUX Page with the following data:</p> <ul style="list-style-type: none"> VOLT: 11.9 FUEL LPH: 0.0 OAT °C: N/A FLIGHT: 0:46 TRIP: 1:27 TIMER: 0:00:00 LTRS REM: -99.0 LTRS USED: 13.5 TIME REM: 0:00 	<p>This page displays</p> <ul style="list-style-type: none"> • Voltmeter • Fuel flow • Outside air temperature (OAT) • Timers • Fuel remaining
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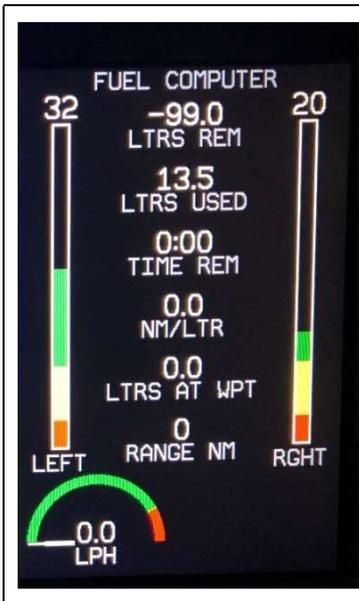
4.3 EMS Page

 <p>The screenshot shows the EMS Page with the following data:</p> <ul style="list-style-type: none"> TACH: 0 OIL: 0.0 BAR FUEL: 0.0 LPH Oil temperature: 30 °C Fuel level: 32 LTR Fuel flow: 20 LTR CHT: 29 °C Oil pressure: 29 BAR 	<p>This page displays</p> <ul style="list-style-type: none"> • RPM • oil temperature • oil pressure • cylinder head temperature (CHT) • fuel level • fuel flow
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4.4 TIMES Page

 <p>The screenshot shows the following data:</p> <ul style="list-style-type: none"> TIME <ul style="list-style-type: none"> LOCAL: 4:37:11 PM ZULU: 12:07:11 AM TIMERS <ul style="list-style-type: none"> FLIGHT: 0:46 TRIP: 1:27 TIMER: 0:00:00 ENGINE TIMERS <ul style="list-style-type: none"> TACH: 234.6 HOBBS: 284.1 	<p>The Times Page is divided into three sections: TIME, TIMERS, and ENGINE TIMERS.</p> <p>The Flight Timer shows the total amount of time that oil pressure is above 15 PSI since the D180 was turned on; it does not reset until the next time the D180 is power-cycled and oil pressure reaches 15 PSI.</p> <p>The Trip Timer shows cumulative flight time since a manual reset. The third line of this section contains the general purpose Timer which can be used for a variety of functions including a tank timer.</p> <p>The Tach Timer keeps track of engine time (normalized to cruise RPM). The Hobbs Timer records the duration of time engine oil pressure is at 15 PSI or higher.</p> <p>NOTE: The Hobbs Timer reading is to be noted in the flight log as a record of engine operation time.</p>
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4.5 EMS FUEL Computer Page

 <p>The screenshot shows the following data:</p> <ul style="list-style-type: none"> FUEL COMPUTER 32 (LEFT tank level) 20 (RIGHT tank level) -99.0 LTRS REM 13.5 LTRS USED 0:00 TIME REM 0.0 NM/LTR 0.0 LTRS AT WPT 0 RANGE NM 0.0 LPH (fuel flow) 	<p>This page displays fuel tank levels, fuel flow, fuel pressure, fuel remaining, fuel used, and time remaining.</p> <p>NOTE: Operation of the fuel computer is not recommended for basic flight operations. Even for advanced operations, due to the accuracy of Jabiru fuel gauges, the fuel computer should not be used unless the tanks are full at the beginning of calculations.</p>
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4.6 HSI Page



This page displays the GPS local magnetic heading.

5 Autopilot Operation

This section guides you through the indicators and operation of D180's EFIS-based Autopilot (AP) and AP74 Control Panel systems.

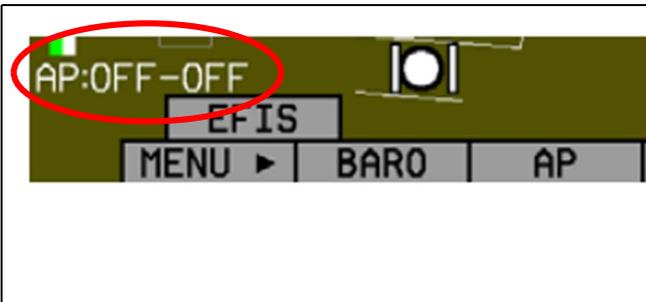
NOTE:

The J230 is very light and the AP servos are very responsive. The AP should be disengaged in anything more than occasional light turbulence otherwise damage to the servos may occur.

5.1 EFIS AP Menu and Displays

AP information is displayed on the EFIS page.

5.1.1 EFIS AP Menu and Status



The AP status is displayed in the lower left of the EFIS page. The left indicator displays the state of the roll servo, and the right indicator displays the state of the pitch servo.

The AP menu is available on the EFIS main menu.

The BUGS menu is available under the AP menu.

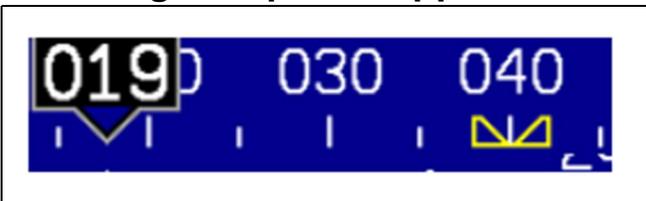
5.1.2 Bugs Display



Whenever either the heading or altitude Bug is toggled ON, its current value is displayed in the lower right corner of the EFIS page.

In the example image, the heading bug is toggled ON (i.e., displayed on the heading tape), but the AP HDG mode is currently disengaged. The ALT bug is set to 2250ft and the AP is currently engaged.

5.1.3 Bugs Graphical Appearance



When the AP is not engaged for a given axis, the respective BUG is hollow.

When the AP is engaged, the respective BUG solid or filled in.

5.2 AP Modes

<p>HDG: HEADING MODE – ROLL SERVO</p>	<p>In Heading Mode, the AP uses the roll servo to control the aircraft’s magnetic heading.</p> <p>You may adjust the heading bug to direct the aircraft to a new target heading with the AP engaged.</p> <p>NOTE: The magnetic heading is affected by wind.</p>
<p>TRK: GROUND TRACK MODE – ROLL SERVO</p>	<p>In Track Mode, the AP uses the roll servo to control the aircraft’s GPS ground track.</p> <p>You may adjust the heading bug to direct the aircraft to a new target track with the AP engaged.</p>
<p>180: 180° TURN MODE – ROLL AND PITCH SERVOS</p>	<p>This mode initiates a quick turnaround. The AP engages both servos to hold altitude in a left turn until the aircraft is flying in the opposite direction, and then remains in TRK and ALT hold modes.</p>
<p>NAV: GPS NAVIGATION MODE – ROLL SERVO</p>	<p>To use the GPS-based NAV mode, the GPS must have an active waypoint. When engaged, the AP takes instruction from the GPS unit’s horizontal navigation information.</p>
<p>ALT: ALTITUDE MODE – PITCH SERVO</p>	<p>In Altitude Mode, the AP uses the pitch servo to control the aircraft’s altitude.</p> <p>You may adjust the altitude bug to direct the aircraft to a new target altitude with the AP engaged.</p> <p>NOTE: Input to engine power management is required to climb or descend the aircraft within normal operating airspeeds.</p>

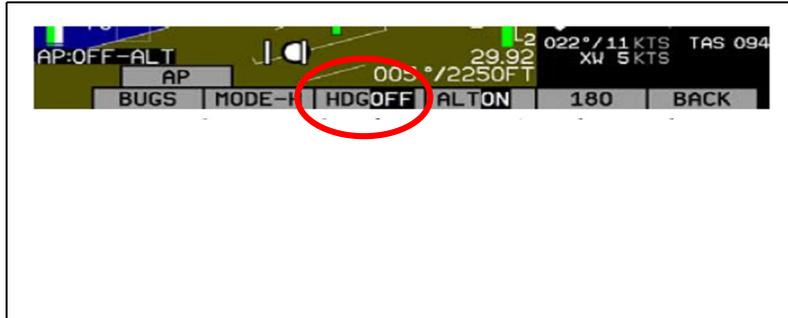
5.3 EFIS Autopilot Control

	<p>This section describes the various AP control functions available via the EFIS > AP menu.</p>
	<p>The AP menu includes the buttons shown:</p>

5.3.1 Mode -(H, T, or N)

	<p>The MODE button is followed by the currently active lateral mode: H (HDG), T (TRK), or N(NAV).</p> <p>Pressing this button brings up another menu where you can select the armed AP mode. As soon as you select a mode, the AP menu is immediately displayed again.</p>
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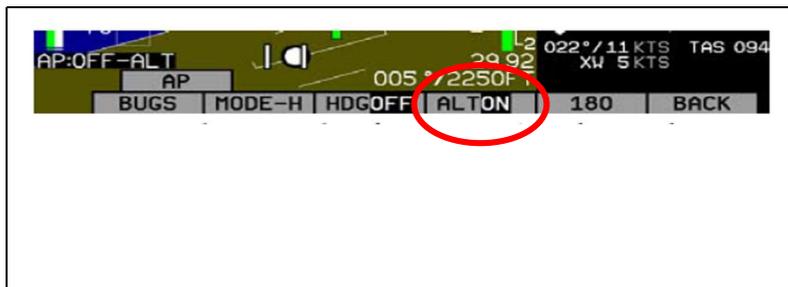
5.3.2 (HDG, TRK or NAV) OFF/ON



This button toggles the roll servo ON and OFF in the specified mode.

NOTE:
When the AP is engaged in HDG or TRK mode, the heading bug is synchronized to the current heading or ground track, respectively. The heading or track bug is then adjusted while the AP is engaged.

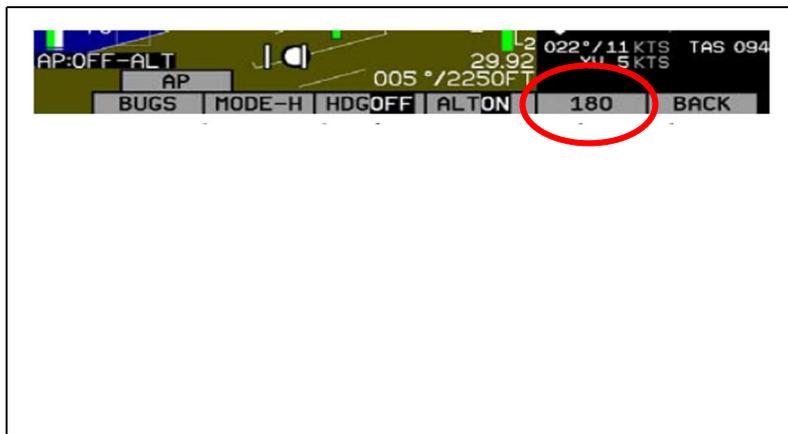
5.3.3 ALT OFF/ON



This button toggles the pitch servo ON and OFF.

NOTE:
When the AP is engaged in ALT mode, the ALT bug is synchronized to the current altitude. The altitude bug is then adjusted while the AP is engaged.

5.3.4 180

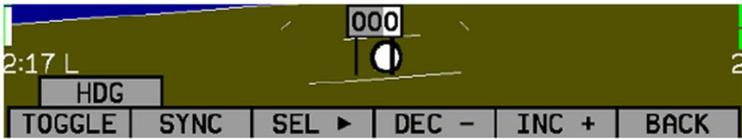
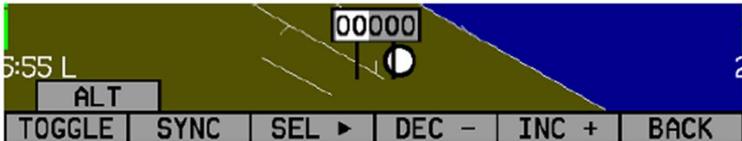


This button sets a TRK bug 180° from the current ground track.

The AP engages both servos to hold altitude in a left turn until the aircraft is flying in the opposite direction. While in the 180 mode, the 180 button is highlighted and the AP status indicator displays 180 in the roll axis position.

Once the turn manoeuvre has been completed, the AP remains in TRK and ALT hold modes.

5.3.5 BUGS

	<p>You can set a marker or BUG to appear on any or all of the three tapes.</p> <p>Choose the type of bug to configure: HDG/TRK (heading/track), IAS (Indicated airspeed).</p>
<p>Heading / Track</p> 	<p>TOGGLE: Turns the heading or track bug on and off on the heading tape.</p> <p>SYNC: Synchronises the bug to the current heading or track.</p> <p>SEL▶: Selects which digit to change.</p> <p>DEC-: Decreases selected digit.</p> <p>INC+: Increases selected digit.</p> <p>AP74 VALUE: When in the heading or track menus, rotation of the VALUE knob will rapidly alter the setting.</p>
<p>Airspeed</p>	<p>NOTE:</p> <p>A bug may be set for the airspeed but can not be controlled through the autopilot.</p>
<p>Altitude</p> 	<p>TOGGLE: Turns the altitude bug on and off on the altitude tape.</p> <p>SYNC: Synchronises the bug to the current altitude.</p> <p>SEL▶: Selects which digit to change.</p> <p>DEC-: Decreases selected digit.</p> <p>INC+: Increases selected digit.</p> <p>AP74 VALUE: The altitude bug can be adjusted at any time using the VALUE knob.</p>

5.3.6 Out of Trim Indicator

	<p>When the Autopilot is flying the aircraft in Altitude Mode, an out-of-trim indicator can appear to the right of the AP Status Indicator. This alerts you when there is excessive load on the pitch servo. The indicator instructs you in the direction to trim the nose to reduce elevator load.</p>
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5.4 AP74 Autopilot Control

The AP74 has all the functionality of the EFIS > AP menu while providing an alternate way to interpret and use the Autopilot.

5.4.1 AP74 Indicators

	<p>The AP74 red button indicator lights have the following meanings:</p> <ul style="list-style-type: none"> AP ON when <i>any</i> servo is active. HDG ON when the roll servo is armed or active in the heading mode. TRK ON when the roll servo is armed or active in the ground track mode. NAV ON when the roll servo is armed or active in the GPS navigation mode. ALT ON when the pitch servo is armed or active in the altitude mode.
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5.4.2 AP74 Controls

<p>AP Button</p>	<p>When its indicator is off, pressing the AP button engages the AP in the pre-armed mode(s).</p> <p>When the AP button's indicator is on, pressing the AP button disengages all axes of the AP, but leaves the last-used modes armed.</p> <p>If you push and hold the AP button for 2 seconds, the AP engages in 180 Mode.</p> <p>NOTE: The HDG/TRK and ALT bugs are synchronized to the heading/track and altitude values each time the AP is engaged.</p>
<p>VALUE Knob</p>	<p>When no menus are displayed, the VALUE knob changes the HDG/TRK bug, ALT bug or BARO setting. Press the VALUE knob to cycle between modes.</p> <p>When in any EFIS menu which adjusts a numerical value, turning the VALUE knob adjusts the selected parameter.</p> <p>Pressing the VALUE knob when in any menu exits the menu system completely.</p> <p>Pushing and holding the knob while changing a bug synchronizes the bug to the current value.</p>
<p>HDG Button</p>	<p>When its indicator is off, pressing the HDG button arms the roll servo in Heading Mode and turns on the indicator.</p> <p>When its indicator is on, pressing the button disarms/deactivates the roll servo and turns off the button's indicator.</p>
<p>TRK Button</p>	<p>When its indicator is off, pressing the TRK button arms the roll servo in Track Mode and turns on the indicator.</p>

	When its indicator is on, pressing the button disarms/deactivates the roll servo and turns off the button's indicator.
NAV Button	When its indicator is off, pressing the NAV button arms the roll servo in Navigation Mode and turns on the indicator. When its indicator is on, pressing the button disarms/deactivates the roll servo and turns off the button's indicator.
ALT Button	When its indicator is off, pressing the ALT button arms the pitch servo in Altitude Mode and turns on the indicator. When its indicator is on, pressing the button disarms/deactivates the pitch servo and turns off the button's indicator.

5.5 HSI - GPS Overlay

The HSI will overlay GPS information while the GPS has an active flight plan between two points.

	<p>Text displays. In this area a variety of information is displayed in text format. Displayed here is the ground track (TRK), the course (CRS), ground speed (SPD), distance to next waypoint (DTW), and up to two bearing pointer selections.</p> <p>Course indicator. The course indicator points in the direction of the course that the GPS is reporting. In a situation with no winds, keeping the course indicator pointed straight up and in line with the heading pointer keeps the aircraft on course. This indicator is fixed to the rotation of the DG, so it is easy to see which way you must turn to get on course.</p>
	<p>To indicator. This arrow always points the same way as the course line, as indicated in the small oval.</p> <p>Course Deviation Indicator (CDI). The CDI indicates how far to the left or right of your selected ground course you are (CDI in large oval).</p> <p>Depending on the scale that you are in, each dot indicates 0.06 n.m. (Approach), 0.2 n.m. (Terminal), or 1.0 n.m. (Enroute). When on course, the course indicator and the CDI make a solid line, making it easy to see when there is little error in your aircraft's position. Unlike a CDI indicator found in basic aircraft, the CDI needle on an HSI rotates with the DG and course indicator. By turning the aircraft towards the CDI needle so the CDI needle is on top of the course line you reduce your deviation.</p>
	<p>Track indicator. This indicates your direction over the ground as reported by the GPS. This is different than your magnetic heading when there are crosswinds present. Since this is your actual ground track, keeping this directly above your course pointer (when the CDI is centered) keeps you on course, even if your magnetic heading is different.</p>
	<p>Scale indicator. This shows you what scale the CDI is using. Since serial GPS streams do not indicate the correct scaling mode, this must be configured manually with the "scale" button under the HSI menu.</p> <p>The three options are "E" for enroute (5 n.m. full scale), "T" for terminal (1 n.m. full scale), an approach (0.3 n.m. full scale). The current scale name and full scale range is indicated on the screen.</p>

BARO – Changing Altimeter Setting

- Set the primary altimeter to the correct altitude (eg 110ft at YREN).
- Take the pressure reading from the altimeter.
- Press button 2 to open the EFIS menu
- Select the EFIS BARO option.
- Adjust using DEC- and INC+ buttons.
- Press BACK and then EXIT to exit the EFIS menu.
- The altimeter pressure reading is displayed in the lower right of the screen.

Flight Log – Time

- Change the screen to show the TIMES page.
- Record HOBBS timer reading.

AP – Quick Reference

Ground Track – eg using Oz Runways

- Arm the TRK and ALT on the AP74
- Engage AP
- TRK and ALT are synchronised to current
- Adjust TRK using the VALUE knob or EFIS > AP > BUGS
- Adjust ALT using the AP74 VALUE knob (press to cycle) or EFIS > AP > BUGS

NAV – using GPS

- Arm the NAV and ALT on the AP74
- Engage AP
- ALT is synchronised to current. NAV is set to GPS track.
- Adjust ALT using the AP74 VALUE knob (press to cycle) or EFIS > AP > BUGS