

FS9 PILATUS PC-12 PANEL



USERS MANUAL

Pilatus PC-12 Panel Definitions



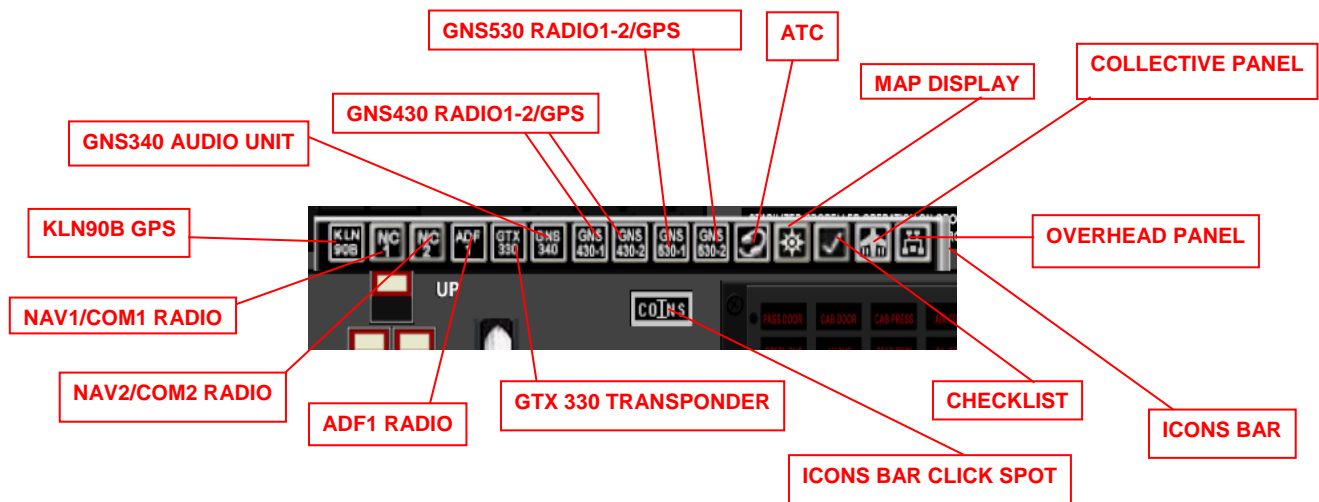
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1. ICONS AND POPUP WINDOWS

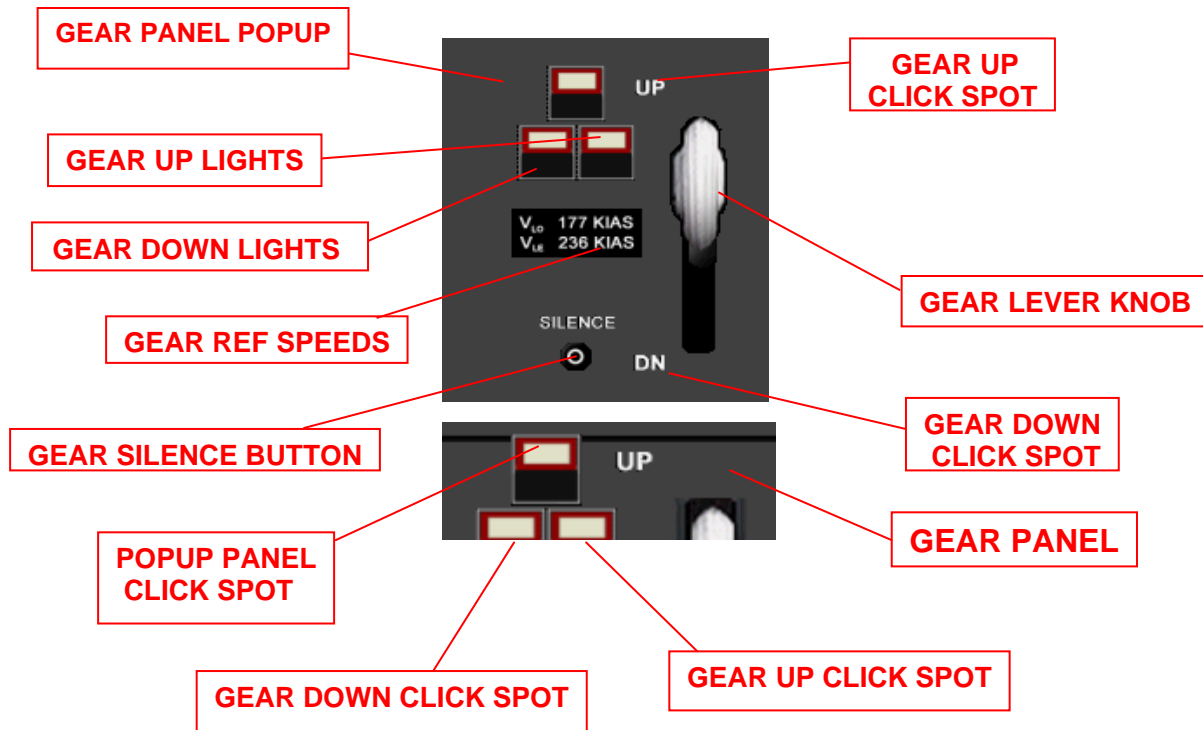


The icons bar contains 15 different icons for the various popup windows. The icons bar is not visible by default, and is turned on (and off) by clicking on the ICONS BAR CLICK SPOT. The first 6 icons from the left are sort of “reverse” popup windows in the sense they are on by default and turned off (or hidden) by clicking on the corresponding icon in the icons bar. The remaining icons are for popup windows that are off by default. There are also 4 other click spots on the panel for popup windows that are discussed in the appropriate sections. This includes popup windows for the lights, start, gear, and CAWS panels. In addition, each radio has a popup click spot in the upper left hand corner to zoom out the view for easier reading.

Instruction:

1. Click on the ICONS BAR CLICK SPOT to bring up the icons bar window.
2. Click on the desired icon to turn on or off the corresponding popup window.
3. Click on the ICONS BAR CLICK SPOT again to hide the icons bar window.

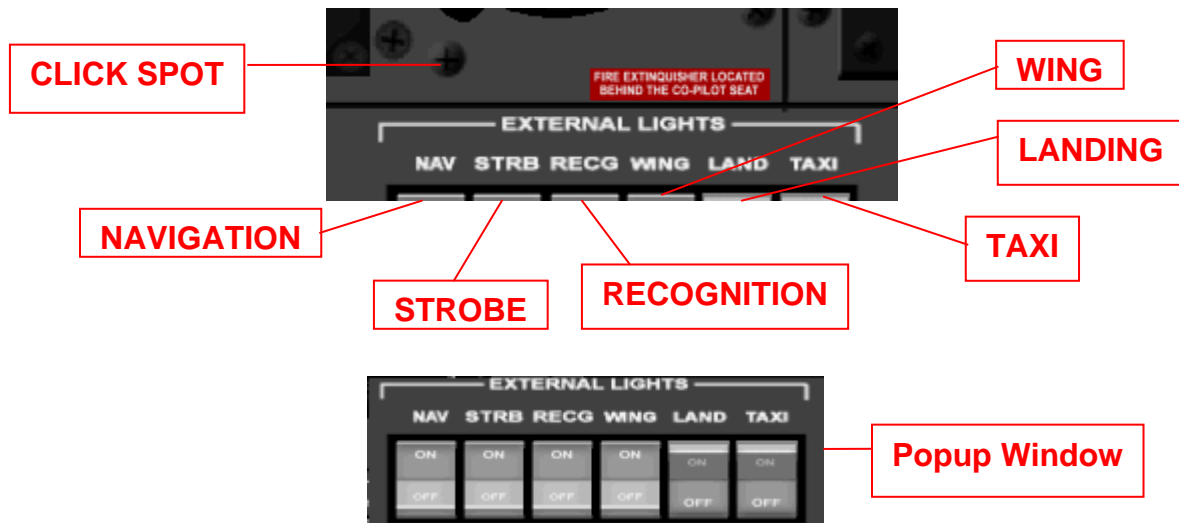
2. GEAR PANEL



The GEAR PANEL (lower figure) contains the pertinent information for raising and lowering the landing gear. It contains the GEAR LEVER KNOB and 3 GEAR UP/DOWN LIGHTS indicators corresponding to each of the wheels of the aircraft. The landing gear shown above is in the “up” position. In the “down” position the upper red boxed indicator is off and a lower green boxed light is on. Both are on during gear transition. To toggle gear down, click on the lower left gear light. Click on the right lower light to toggle gear up.

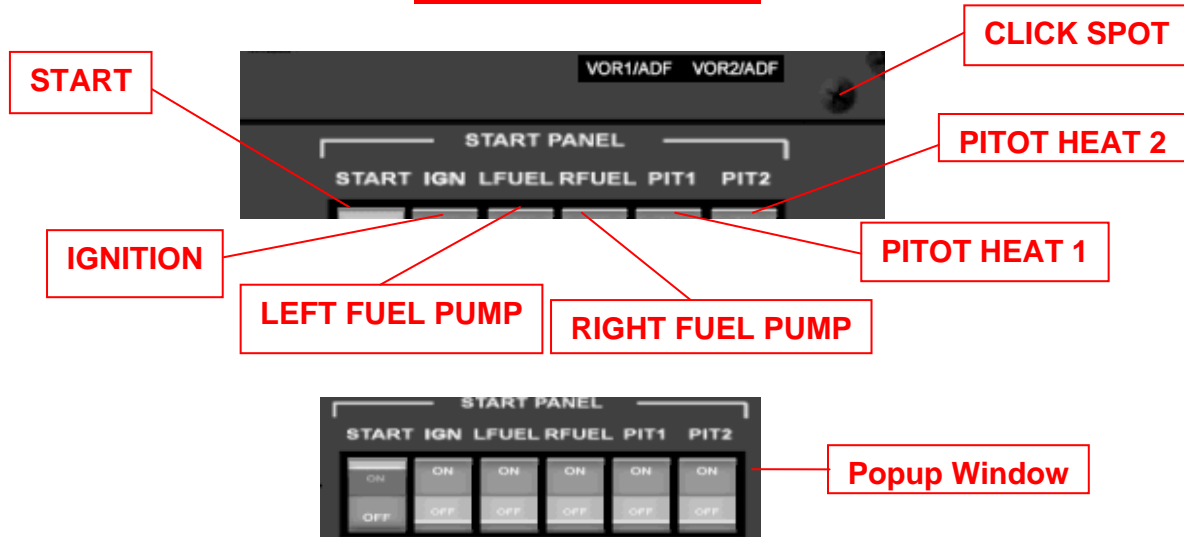
The gear panel is too large to put any more of it into the panel, so it is available as a popup window. Click on the upper light indicator to turn the popup on (upper figure). The gear lever knob and all lights are available for viewing. Gear can be raised and lowered from this panel by clicking on the lower left or lower right light, respectively.

3. EXTERNAL LIGHTS PANEL



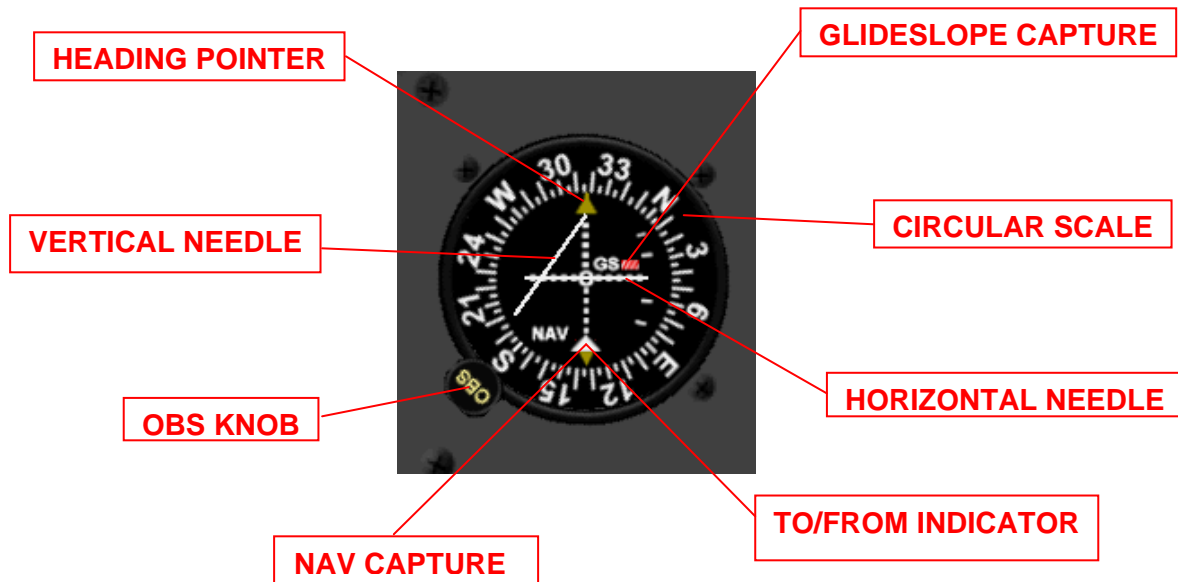
The EXTERNAL LIGHTS PANEL contains the switches for the various external lights. The identity of each switch is listed directed above the switch. The popup window is viewed by clicking on the CLICK SPOT (screw head).

4. START PANEL



The START PANEL contains various switches related to starting and maintaining the aircraft. The identity of each switch is listed directed above the switch. The popup window is viewed by clicking on the CLICK SPOT (screw head).

5. VOR INDICATOR



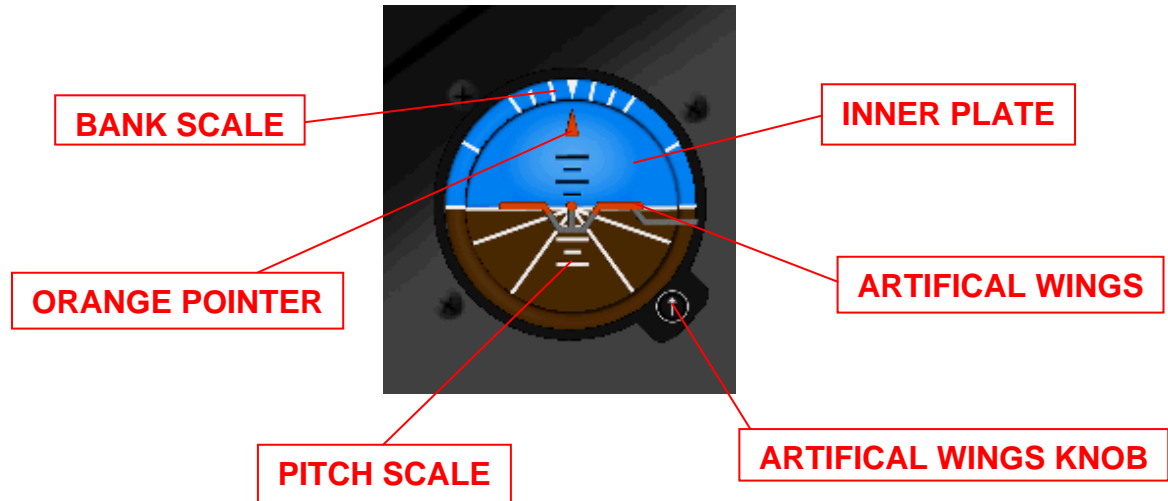
This VOR indicator is used primarily as a back-up navigation system and has both horizontal and vertical navigation capabilities. In this aircraft it is slaved to the Nav2 radio.

Instructions:

1. Tune the Nav2 radio to the desired frequency. If an appropriate signal is received, the striped red NAV CAPTURE rectangle at the bottom is replaced by a white TO/FROM pointer (pointer shown above). The striped red GLIDESLOPE CAPTURE rectangle disappears if a signal with glideslope capability is received.
2. Rotate the circular scale using the OBS KNOB until the solid VERTICAL NEEDLE is on top of the vertical dotted white line. The yellow HEADING POINTER triangle will point to the direction of the station as shown on the CIRCULAR SCALE. If the VERTICAL NEEDLE is to the left of the vertical dotted line you are to the right of the desired track and need to go to the left. Similarly, if it is to the right you are to the left of the desired track. Make directional change to keep the VERTICAL NEEDLE centered.

If a glideslope signal is received, the HORIZONTAL NEEDLE will move up and down depending on the relative position of the aircraft to the glideslope. When the HORIZONTAL NEEDLE is directly on top of the horizontal dotted white line you are on the glideslope. If the HORIZONTAL NEEDLE is above the horizontal dotted white line you are below the glideslope, and if it is below the line you are above the glideslope. Make altitude and vertical speed changes to keep the HORIZONTAL NEEDLE centered.

6. STANDBY ATTITUDE INDICATOR

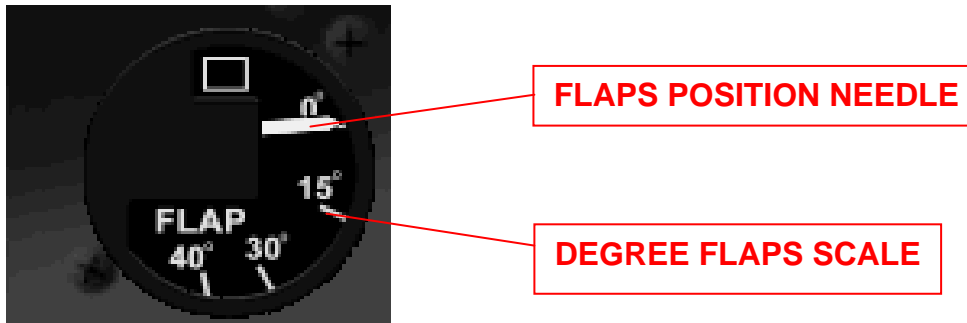


The standby attitude indicator (AI) is included in the panel as a backup to the primary flight display (PFD) in case of failure.

Instructions:

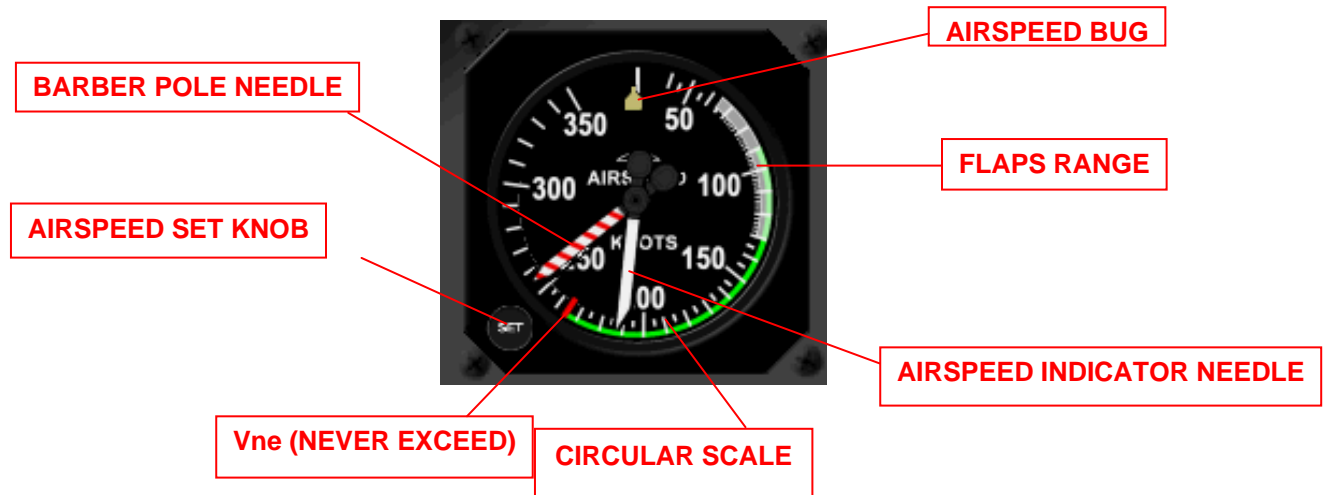
1. With the engine running, center the ARTIFICIAL WINGS over the solid white line on the INNER PLATE using the ARTIFICIAL WINGS KNOB.
2. Pitch is measured using the vertical ladder scale on the INNER PLATE, and bank is measured using the outer BANK SCALE.
3. The pitch scale is graduated into 5 degree units to a maximum of +/- 30 degrees. The value is indicated by the position of the ARTIFICIAL WINGS.
4. The BANK SCALE is divided into 10, 20, 30, 45, and 60 degree values. The degree of bank is indicated by the position of the ORANGE POINTER.

7. F LAPS INDICATOR



The divisions on the DEGREES FLAPS SCALE correspond to the degrees of flap. There are 4 positions: 0, 15, 30 and 40 degrees. The FLAPS POSITION NEEDLE points to the current degrees of flap.

8. AIRSPEED INDICATOR



The CIRCULAR SCALE has values ranging from 0 to 350 knots indicated airspeed (KIAS). The white region of the CIRCULAR SCALE shows the KIAS range for flap deployment. The lower end of this region corresponds to the full flaps stall speed, while the upper end corresponds to the maximum KIAS for flap deployment. A red marker shows the NEVER EXCEED speed (Vne). A yellow AIRSPEED BUG is used in setting the autopilot airspeed value (see below) and is rotated around the CIRCULAR SCALE using the AIRSPEED SET KNOB. The value is decreased by rotating the knob to the left (click on the “ – “sign at left edge of knob), and is increased by rotating the knob to the right (click on the “ + “sign at right edge of knob).

Instructions:

1. Airspeed (KIAS) is read directly off the CIRCULAR SCALE as indicated by the AIRSPEED INDICATOR NEEDLE.
2. There are several ways to set the autopilot airspeed value to the desired airspeed. One way is to first get to desired airspeed, and then turn on the autopilot airspeed hold button on the autopilot panel. This will slew the AIRSPEED BUG to the current airspeed and the autopilot will hold that airspeed. Alternatively, if the autopilot airspeed hold is already on, the AIRSPEED BUG can be set to the desired airspeed using the AIRSPEED SET KNOB. The autopilot airspeed hold will take the aircraft to the new setting and hold that airspeed.
3. The AIRSPEED BUG can be slewed to the current airspeed at any time by clicking in the middle of the AIRSPEED SET KNOB. If the autopilot airspeed hold is on, the aircraft will hold the current airspeed.

4. Keep in mind that the AIRSPEED BUG is always slewed to the current airspeed when the autopilot airspeed hold button is clicked on. This disallows you, for example, to set the bug to the desired airspeed, and then turn on the autopilot. You must first turn on the autopilot and then set the bug.

9. DUAL RADIO MAGNETIC INDICATOR

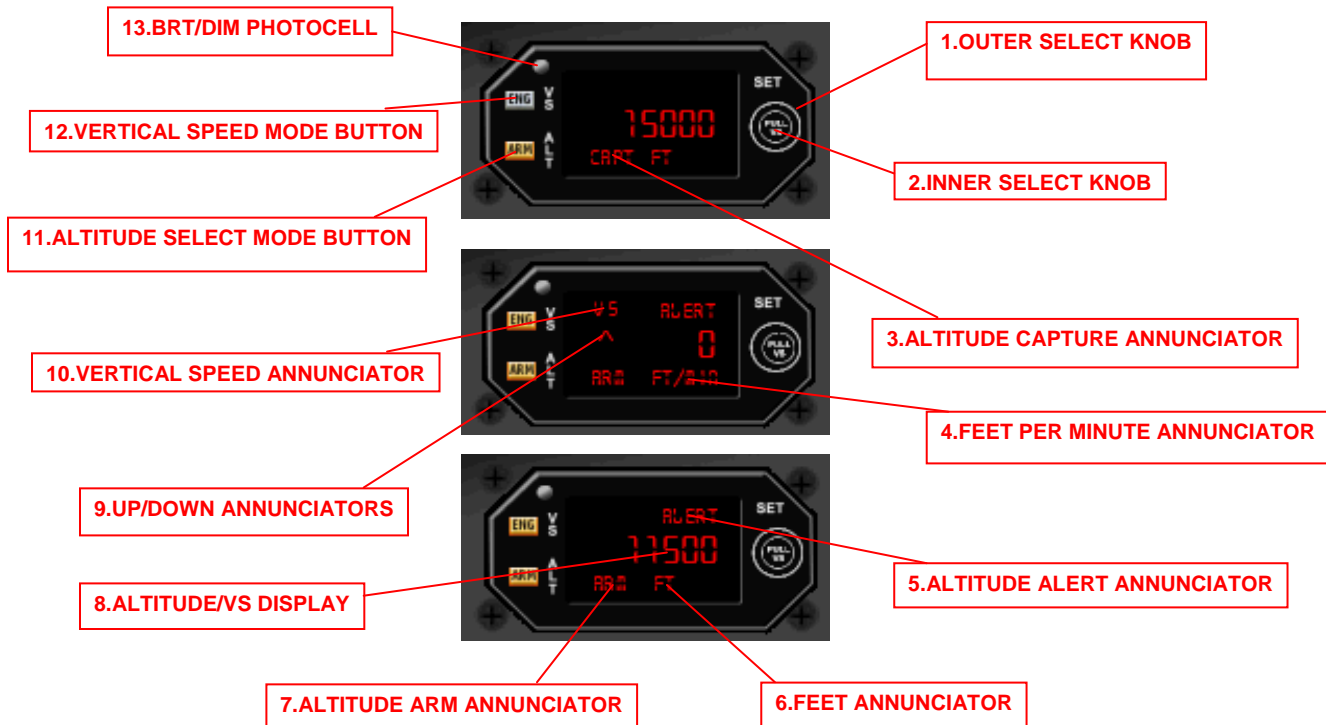


The RADIO MAGNETIC INDICATOR (RMI) is used in horizontal navigation. The chief advantage of the RMI is that the direction to the station is shown directly by the Nav needles (arrows). The VOR1/ADF1 needle is colored green and the VOR2/ADF2 arrow is yellow. The RMI contains a typical compass rose set to magnetic north which rotates with the aircraft, and the Nav needles follow this rotation so that they always point to the direction of the tuned station. The left side of the RMI is devoted to VOR1/ADF1 function, and the right side to VOR2/ADF2 function. Clicking on the VOR1/ADF1 SWITCH toggles VOR1 and ADF1 reporting. Similarly, clicking on the VOR2/ADF2 SWITCH toggles VOR2 and ADF2 reporting (ADF2 is not active in this aircraft). Double yellow VOR/ADF INDICATOR arrows on each side show which signal is being reported.

Instructions:

1. Set the Nav1, Nav2, and ADF1 radios to the appropriate stations.
2. If the VOR/ADF INDICATORS are set to VOR and no signal is received, the respective arrows will point to 180 degrees.
3. If the VOR/ADF INDICATORS are set to ADF and an Adf signal is not received, the Adf1 needle will be horizontal, and the Adf2 needle will be vertical, and neither will rotate with the compass rose.
4. If any, or all, of the Nav1, Nav2, and ADF1 radios are receiving a signal, the VOR/ADF NEEDLES will rotate and point to the direction of the tuned station as shown on the compass rose. Use the VOR/ADF SWITCHES to toggle between Nav and ADF radios. The NAV/ADF INDICATOR arrows will point to the current choice.

10. KAS 297C PREALTITUDE AND VERTICAL SPEED SELECTOR



1. **OUTER SELECT KNOB:** The outer select knob is used to set the desired altitude and vertical speed. Clicking on the right side increases the numerical value, whereas clicking on the left decreases the value. Each click increments or decrements the altitude or vertical speed value by 100 feet, up to a maximum altitude of 35,000 feet and a maximum vertical speed of 3000 ft/min.
2. **INNER SELECT KNOB:** The inner select knob is used to select between the altitude and vertical speed displays. When the knob is pushed in, the altitude screen is displayed and adjustments to altitude are made. When the knob is pulled out, the vertical speed screen is displayed and changes to the vertical speed are made. This knob is toggled in and out by clicking in the center of the button.
3. **ALTITUDE CAPTURE ANNUNCIATOR:** This annunciator signals a switch from a vertical hold mode to a roundout mode, and is visible when the aircraft is less than 200 feet above or below the set altitude.
4. **FEET PER MINUTE ANNUNCIATOR:** Visible in the vertical speed mode and indicates the value displayed is in ft/min.

5. **ALTITUDE ALERT ANNUNCIATOR:** This annunciator alerts the pilot that the set altitude is approaching. The annunciator is on when the aircraft is between 300 and 1000 feet of the set altitude.
6. **FEET ANNUNCIATOR:** Only visible in the altitude select mode and shows the value is displayed in feet.
7. **ALTITUDE ARM ANNUNCIATOR:** Indicates the KAS 297C is armed to capture the selected altitude, and is displayed until 200 feet from the set altitude.
8. **ALTITUDE/VERTICAL SPEED DISPLAY:** Numerical display of the altitude when in the altitude mode, and vertical speed when in the vertical speed mode.
9. **“UP/DOWN” ANNUNCIATORS:** Visible in the vertical speed mode and shows if the aircraft is ascending or descending at the displayed value.
10. **VERTICAL SPEED ANNUNCIATOR:** Visible when in the vertical speed mode to signify the vertical speed mode is engaged.
11. **ALTITUDE SELECT MODE BUTTON:** Arms the altitude mode for altitude capture.
12. **VERTICAL SPEED MODE BUTTON:** Engages and disengages the vertical speed mode.
13. **BRT/DIM PHOTOCELL:** Senses the amount of light and adjusts the display brightness accordingly (inactive).

The KAS 297C Prealtitude and Vertical Speed Selector provides the pilot a means to preset, arm, and capture a given altitude, and the ability to define the vertical speed used to get there. It interfaces with the altimeter and the autopilot, and requires the autopilot altitude hold to be on. The KAS 297C does not turn the autopilot hold on, it must be turned on in the autopilot panel. There are 2 screens, one showing altitude information (altitude screen) and one showing vertical speed information (VS screen). The 2 screens are interchanged using the INNER SELECT KNOB as described above. Altitude and vertical speed values can be changed at any time using the OUTER SELECT KNOB.

The KAS 297C is generally described in terms of an altitude select mode and a vertical speed mode. Before discussing these modes however, it is important to understand 2 basic principles.

The first is that when you turn on the autopilot hold, the aircraft will go to the set altitude at the set vertical speed displayed in the vertical screen. If this value has not been changed, and you have not engaged the vertical speed mode, it will be the default value of 1680 fpm. One example of this importance is if you are climbing at ~800 fpm, and the vertical speed setting is the default value, the aircraft will pitch up and begin to climb at the default value of 1680 fpm if the autopilot altitude hold is on, which may or may not be what is desired. This does not happen when the autopilot hold is turned on in the vertical speed mode since the vertical speed is reset to the current pitch (see below).

The second is that the vertical speed value can be viewed and changed at any time by going to the vertical screen (INNER SELECT KNOB out). This allows you to observe and/or change the vertical speed value without changing modes.

In the altitude select mode, as the aircraft is climbing or descending, the ALTITUDE SELECT MODE BUTTON is pushed (armed) and the current pitch of the aircraft is maintained (referred to as the pitch mode). [Note: this pitch will be maintained to the altitude limit of the aircraft if the autopilot hold is not turned on at some time.] The ALTITUDE ARMED ANNUNCIATOR will come on immediately and stay on until 200 feet from the set altitude, at which time the ALTITUDE CAPTURE ANNUNCIATOR will come on. At 1000 feet before the set altitude, the ALTITUDE ALERT ANNUNCIATOR will come and stay on until the aircraft is within 300 feet of the set altitude. The FEET ANNUNCIATOR will be on.

The vertical speed mode is selected by clicking on the VERTICAL SPEED MODE BUTTON. In the vertical speed mode, the pitch of the aircraft is engaged. When engaged, the set vertical speed value displayed in the vertical speed screen changes to a value based on the current pitch of the aircraft. Also, when the VERTICAL SPEED MODE BUTTON is pressed, the (new) current vertical speed will be displayed for 2 seconds and the engage button will remain lit. This allows the pilot to see the current vertical speed without having to go into the vertical speed screen. [Note: this vertical speed will be maintained to the altitude limit of the aircraft if the autopilot hold is not turned on at some time.] As noted, the vertical speed value can be changed by pulling out the INNER SELECT KNOB to get to the vertical speed screen.

In the vertical speed screen, the VERTICAL SPEED ANNUNCIATOR will be on and the “UP/DOWN” ANNUNCIATORS will indicate climb or descent. The FEET PER MINUTE ANNUNCIATOR will be on. Changing the vertical speed value will cause the aircraft to immediately move to that value until the set altitude is reached.

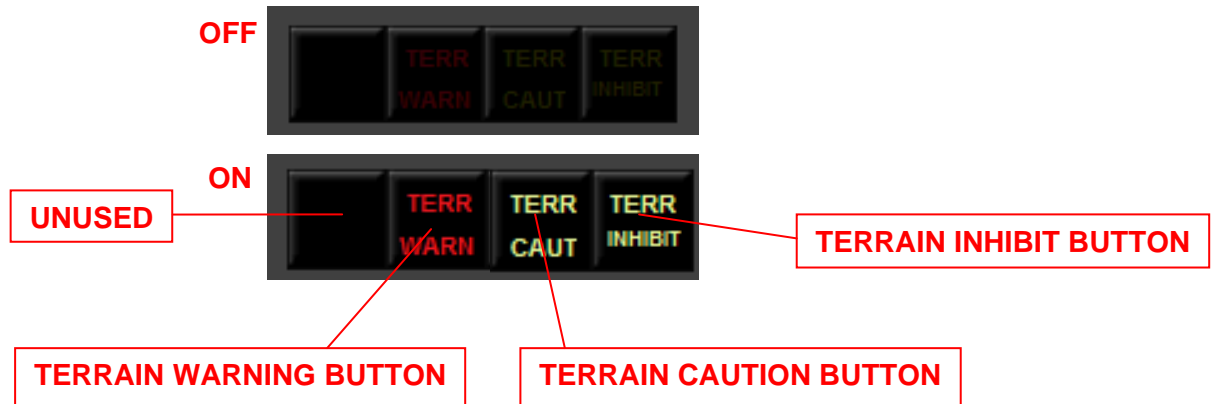
If the VERTICAL SPEED MODE BUTTON is clicked and the altitude select mode is not armed, the aircraft will climb at the current rate, but this value will not be set as a new vertical speed value as when the altitude select mode is on. If the autopilot hold is turned on at this time, the aircraft will change its vertical speed to the set value shown in the display screen.

Note that the vertical speed cannot be changed from 0 unless the indicated altitude is different from the set altitude.

Instructions:

1. With the autopilot altitude hold off, use the INNER and OUTER SELECT KNOBS to select the desired altitude and vertical speed.
2. After takeoff, you now have 2 options. You can turn on the autopilot altitude hold and the aircraft will go to the set altitude at the set vertical speed. Alternatively, you can climb according to the current pitch of the aircraft by clicking on the ALTITUDE SELECT MODE BUTTON. [Remember, the autopilot altitude hold is not on at this time, and if you turn it on the aircraft will climb at the set vertical speed shown in the vertical screen, not the current pitch.]
3. You again have 2 choices. You can turn on the autopilot altitude hold and the aircraft will go to the set altitude at the set vertical speed. Alternatively, you can turn on the vertical speed mode by clicking on the VERTICAL SPEED MODE BUTTON, and climb or descend at the new vertical speed value.
4. If you are at the set altitude and want to go to a different altitude, simply dial in the new altitude on the altitude select screen and the aircraft will immediately start going to that altitude. Care must be taken at this time because the vertical speed will be set to the previous value, which again may or may not be what you want. If not what you want, go to the vertical speed screen and change it. The autopilot altitude hold mode must be on.

11. TERRAIN WARNING SYSTEM



The terrain warning system provides the pilot with a visual warning when the aircraft is nearing terrain. This system is made up of 2 annunciator type warning lights, and an emergency “terrain inhibit” safeguard function.

The first warning is the TERR CAUT annunciator which is on between 1500 and 2500 ft. above the ground. As shown above, the words TERR CAUT are illuminated in yellow when on. The second warning is the TERR WARN annunciator which is illuminated in red between 1000 and 1500 ft. above the ground. Both of these annunciators can be turned off and on by clicking their respective buttons.

The terrain inhibit function is a safeguard against unintentional flight into terrain. When this function is on, the aircraft will not be able to go below 2000 ft. above the ground. If the aircraft goes below 2000 ft., 3 things happen very quickly. One is that the throttle is set to full for maximum power. Another is that the vertical speed goes to 3000 ft/min to get maximum climb. A third is that the autopilot altitude hold setting will increase to 4000 ft. above the current altitude. If the autopilot is not on, it will be automatically turned on. Likewise, if altitude hold is not on it will be turned on. The autopilot heading hold will also be turned on and set to straight ahead. This process will be repeated until the aircraft is higher than 2000 ft. AGL. The terrain inhibiting function is not active until turned on by clicking the TERRAIN INHIBIT BUTTON. When this function is on the words TERR INHIBIT will be illuminated in yellow on the TERRAIN INHIBIT BUTTON.

NOTE: The terrain inhibit function must be turned off when landing and at any time flight is conducted below 2000 feet AGL.

12. ALTIMETER



The altimeter displays the altitude as a digital readout for easy viewing. The value shown changes in units of 10. There is also an altimeter needle that points to 100 place values on the circular scale. The altimeter interfaces with the KAS 297C and the autopilot, and can be used to change the autopilot altitude hold value (see below). The altimeter provides some vertical flight information in the ASCEND/DESCEND CARET and the ALTITUDE CAPTURE LIGHT (see below).

1. **ALTITUDE CAPTURE LIGHT:** This light is illuminated whenever the aircraft is within 25 feet of the altitude hold value.
2. **ALTIMETER NEEDLE:** Points out altitude values in 100 feet units.
3. **ASCEND/DESCEND CARET:** The caret indicates if the aircraft is going up or down. It points up when the aircraft is in level flight or ascending, and points down when the aircraft is descending.
4. **ALTITUDE SELECT KNOB:** The altitude select knob can be used to select and change the autopilot altitude hold value by setting the ALTITUDE SELECT BUG to the desired altitude. This can be done in 2 ways. The first is to rotate the knob by clicking on the left side (decrease) or the right side (increase) to place the bug at the desired value. The second is to click on the knob which will slew the bug to the current altitude. This value is displayed on the KAS 297C altitude select screen.

5. **BAROMETER KNOB:** The barometer knob is used to enter the barometric pressure value. Clicking on the left side of the knob decreases the value, and clicking on the right side increases the value. The barometric pressure is given in units of inches of mercury (IN HG) by default, but will display this value in millibars (MB) by clicking on the barometer knob.
6. **BAROMETRIC PRESSURE:** This is a digital readout of the set barometric pressure value. Clicking on the BAROMETER KNOB toggles between readouts in IN HG and MBs.
7. **INDICATED ALTITUDE:** Digital display of the current altitude. Values change in units of 10.
8. **ALTITUDE SELECT BUG:** As discussed above, the ALTITUDE SELECT BUG is used to set autopilot altitude hold value.

INSTRUCTIONS:

1. Enter the current barometric pressure value using the BAROMETER KNOB.
2. Use the ALTITUDE SELECT KNOB to enter the desired autopilot altitude hold value.
3. If the aircraft is in flight and the autopilot altitude hold is on, changing the ALTITUDE SELECT BUG will cause the aircraft to go to that altitude.

13. NAVIGATION INFORMATION PANEL

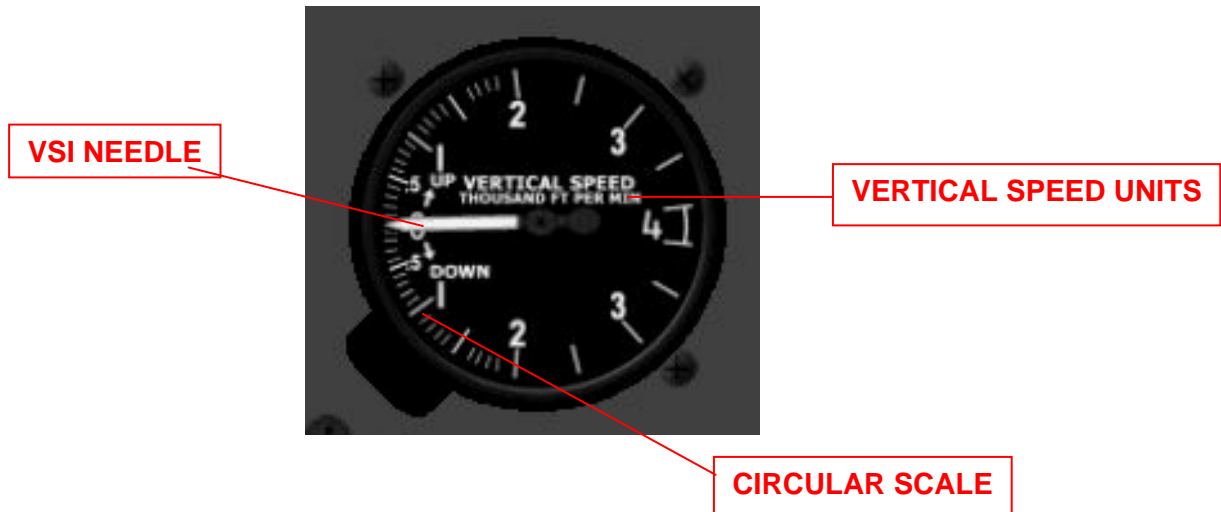


The navigation information panel contains general information regarding the navigational status of the flight. This information includes DME values, LEG versus OBS tracking, autopilot approach status, and the AHR'S system referenced. The AHR'S 2 system serves as a backup to the first in case of an outage.

Definitions and Instructions

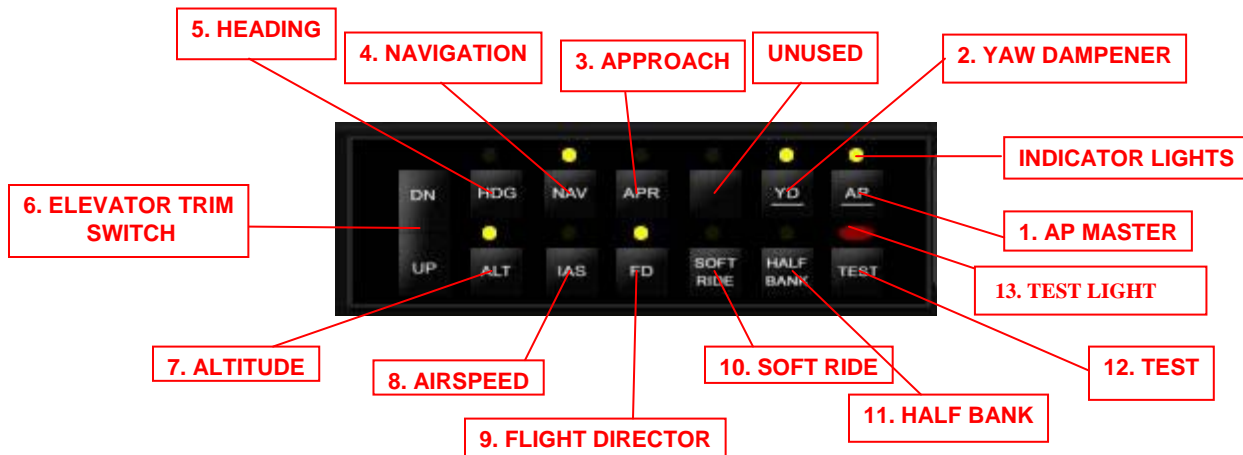
1. **DME1/DME2 BUTTON:** Clicking on this button toggles the DME readout on the EFS 50 between DME1 and DME2. This change is only to the display and does not cause a change in the navigational status of the flight. The light blue annunciation will display N1 or N2.
2. **CRS/LEG BUTTON:** This is an annunciation only button to indicate if tracking is via a flight plan or via an OBS signal. If to a wpt LEG the letters LEG will be displayed, if to an OBS signal the letters OBS will be displayed.
3. **APPROACH BUTTON:** This is an annunciation only button to indicate if the approach mode is active or inactive. A light gray annunciation will display "INACT" if the mode is not activated and ACT if it is.
4. **AHR'S BUTTON:** Clicking on this button toggles the Advanced Heading Reference System between system 1 and 2. A light green number 1 will be displayed if the referenced system is AHR'S 1, and a yellow 2 displayed if system 2.

14. VERTICAL SPEED INDICATOR



The VERTICAL SPEED INDICATOR (VSI) displays the vertical speed of the aircraft in units of feet per minute. Each hash line corresponds to 100 feet differences and the numbers to 1000 feet differences. If the VSI NEEDLE is above zero the aircraft is climbing, if below it is descending.

15. AUTOPILOT PANEL



The AUTOPILOT PANEL contains all of the toggle switches for autopilot functions, and an attenuator switch for changing elevator trim position. These switches and their functions are listed below.

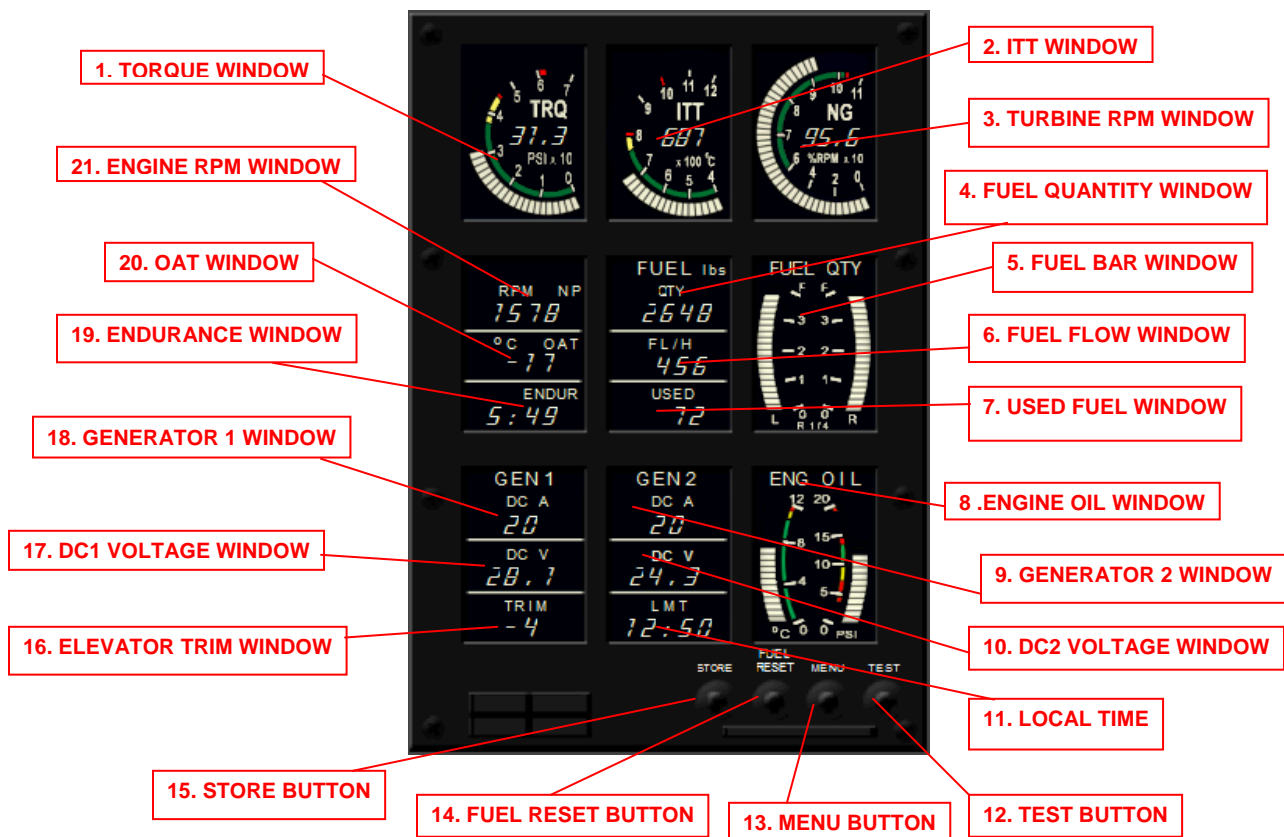
1. **AP MASTER SWITCH:** Toggles the autopilot master on and off. This switch must be on for all autopilot functions (except testing).
2. **YAW DAMPENER SWITCH:** Turn on to automatically dampen excessive yaw.
3. **APPROACH HOLD SWITCH:** Turn on during approach and landing to capture the localizer. Navigation radio must be tuned to a station with a localizer signal.
4. **NAVIGATION SWITCH:** Toggles horizontal navigation on. Includes tracking to or from VOR, NDB and ADF signals.
5. **HEADING SWITCH:** Turns on the heading hold function whereby the aircraft heads in the direction dictated by the heading bug in the EFS 50 (MFD).
6. **ELEVATOR TRIM SWITCH:** Attenuator switch to change the angle of the elevator trim flaps. Click on DN to move trim down, and on UP to move trim up.
7. **ALTITUDE HOLD SWITCH:** Toggles the autopilot altitude hold function. The aircraft will go to the altitude hold value displayed on the altitude select screen of the KAS 297C.
8. **AIRSPEED HOLD SWITCH:** Toggles the autopilot airspeed hold function. Also slews the airspeed bug in the airspeed indicator to the current airspeed.

9. **FLIGHT DIRECTOR SWITCH:** Toggles the autopilot flight director function. The flight director is displayed as a horizontal green bar on the EFS 40 (PFD) and gives vertical flight information.
10. **SOFT RIDE SWITCH:** Not functional in this aircraft.
11. **HALF BANK SWITCH:** When clicked on, with the autopilot on, the aircraft will not be able to bank more than 30 degrees. This function acts as a safety feature. Helpful when flying approaches and when in the circuit.
12. **TEST SWITCH:** Click to test for proper functioning of the autopilot panel. If the autopilot panel is working properly the red TEST LIGHT will illuminate for 2 seconds and then go off.
13. **INDICATOR LIGHTS:** Light-yellow illuminating lights are located above most of the switches, and are on when the corresponding autopilot function is on.

INSTRUCTIONS:

1. Click on/off the appropriate switches to turn on/off their specific autopilot functions.
2. The autopilot master switch must be turned on before the autopilot functions are active.
3. Check to ensure autopilot function is on/off by observing the status of the indicator lights. The status of many of the autopilot functions are also annunciated on the PFD as discussed in that section.

16. ENGINE PARAMETERS PANEL



The engine parameters panel contains a wealth of information about the physical state of the engine and corresponding functions. Information is displayed in digital readouts as bar gauges and as numerical values. In addition, the information displayed in the bar gauges at the top can be displayed in the lower part of the panel by clicking on the menu button (see below). Clicking on the menu button also toggles the time display between Local and Zulu Mean Time.

1. **TORQUE WINDOW:** The current torque value is displayed in this window as a bar gauge in units of psi x 10. A direct digital readout in psi is also displayed. The torque value can be displayed as a numerical value in the ENGINE RPM WINDOW by clicking on the MENU BUTTON.

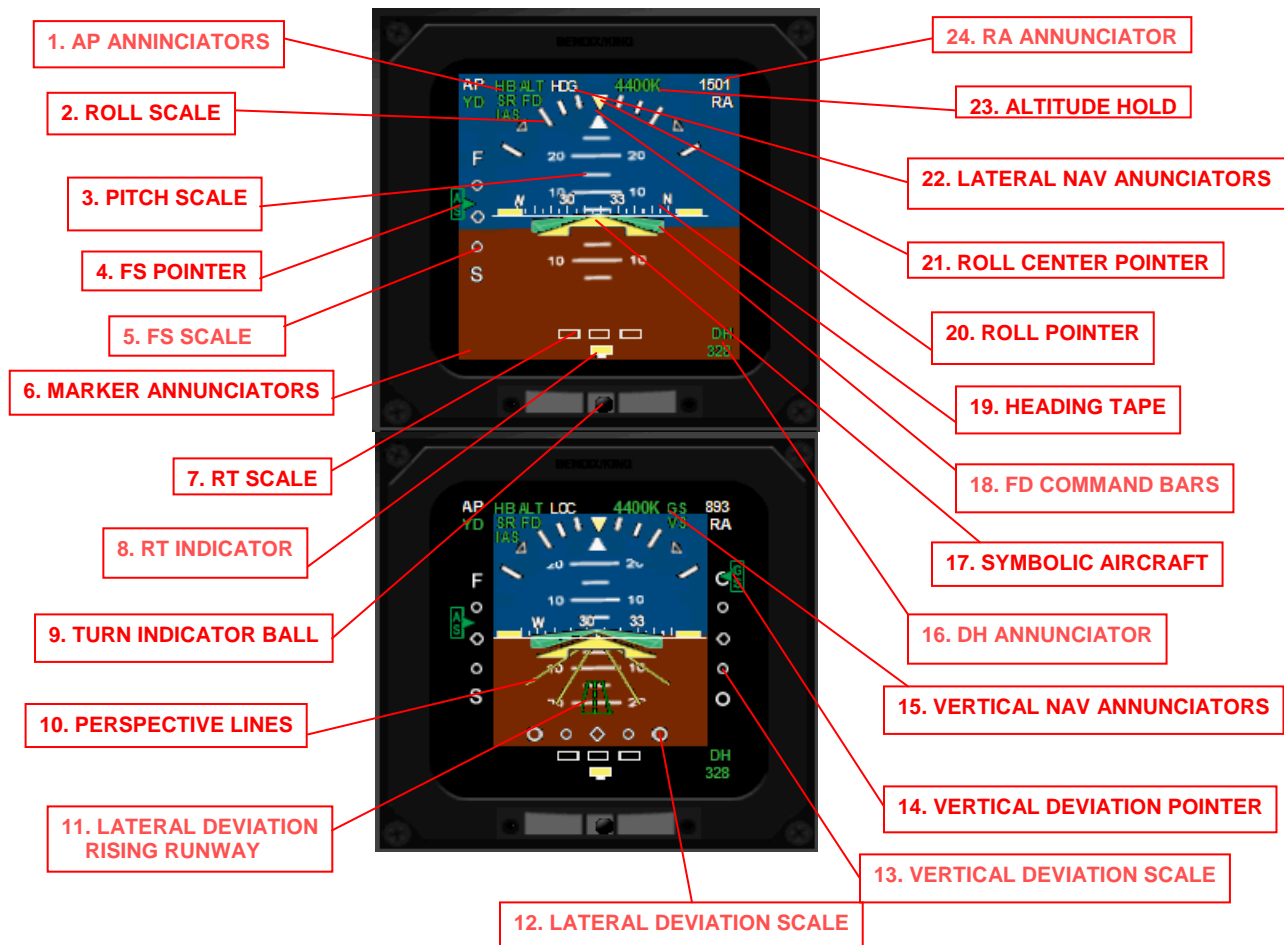
2. **ITT WINDOW:** Displays the inter-turbine temperature as a bar gauge in degrees Celsius x 100, and as a direct digital numerical readout. The ITT value can be displayed in the OAT WINDOW by clicking on the MENU BUTTON.
3. **TURBINE RPM WINDOW:** Displays the turbine RPM as a bar gauge in units of % RPM x 10. This value is also displayed as a numerical value given as % RPM. The ITT value can be displayed in the OAT WINDOW by clicking on the MENU BUTTON.
4. **FUEL QUANTITY WINDOW:** Digital display of the current total amount of fuel onboard in pounds.
5. **FUEL BAR WINDOW:** Displays the total amount of fuel in the left and right fuel tanks as a bar gauge. Values shown are expressed in quarter amounts of total capacity in pounds.
6. **FUEL FLOW WINDOW:** Digital display of the current rate of fuel consumption in pounds per hour.
7. **USED FUEL WINDOW:** Digital display of the amount of fuel used since last resetting given in pounds.
8. **ENGINE OIL WINDOW:** Digital display of the oil temperature in degrees Celsius, and the oil pressure in psi.
9. **GENERATOR 2 WINDOW:** Displays the current bus amperage output of generator 2 bus in amps.
10. **DC2 VOLTAGE WINDOW:** Displays the current bus voltage of the generator 2 bus in volts.
11. **LOCAL TIME WINDOW:** Displays the local mean time in an hr:min format. Clicking on the MENU BUTTON switches the display to ZMT.
12. **TEST BUTTON:** Clicking this button tests for proper functioning of the engine parameters panel. If all is well, the bar gauges will go to maximum, and the numerical values will be replaced by "888" for 2 seconds before returning to normal.
13. **MENU BUTTON:** Clicking this button will change the display content of 5 of the default windows as discussed individually.
14. **FUEL RESET BUTTON:** Clicking this button resets the "fuel used" value displayed in the USED FUEL WINDOW to 0.

15. **STORE BUTTON:** Not functional.
16. **ELEVATOR TRIM WINDOW:** Lists the current elevator trim position in degrees.
17. **DC1 VOLTAGE WINDOW:** Displays the current bus voltage of the generator 1 bus in volts.
18. **GENERATOR 1 WINDOW:** Displays the current bus amperage output of generator 1 bus in amps. This value is replaced by the current battery output when the MENU BUTTON is clicked.
19. **ENDURANCE WINDOW:** Lists the amount of flight time remaining based on the current amount of fuel and rate of fuel consumption. Time is given as a digital readout in an hr:min format.
20. **OAT WINDOW:** Shows the outside ambient temperature in degrees Celsius.
21. **ENGINE RPM WINDOW:** Displays a numerical value of the current RPM of the engine

Instructions:

1. This panel is mostly informational with very little ability to input data.
2. Click the FUEL RESET BUTTON at any time to reset the used fuel value.
3. Click the MENU BUTTON at any time to change the current display.

17. PRIMARY FLIGHT DISPLAY



The Bendix/King EFS40 (electronic flight systems) is a sophisticated primary flight display (PFD). In addition to normal PFD pitch, roll, and yaw information, it can provide information on lateral and vertical navigation, airspeed, and status of the many autopilot functions. It also has a radio altimeter, a "decision height" reminder, marker annunciators (not shown above), and a rising runway that assists in landing and acts as a lateral deviation pointer. There are 2 format modes available; the standard primary mode and the composite mode. Each of these modes have an enroute and an approach mode giving a total of 4 different formatted modes.

The 2 screens shown above represent the standard primary system, and consist of the enroute screen (upper of above) and the approach (lower of above) screen. As the names imply, the enroute mode format is displayed when enroute, and the approach format during an approach. The approach format differs from the enroute format mainly by displaying additional information relevant to that part of the flight; this being the lateral and vertical deviation scales, and the rising runway and perspective lines.

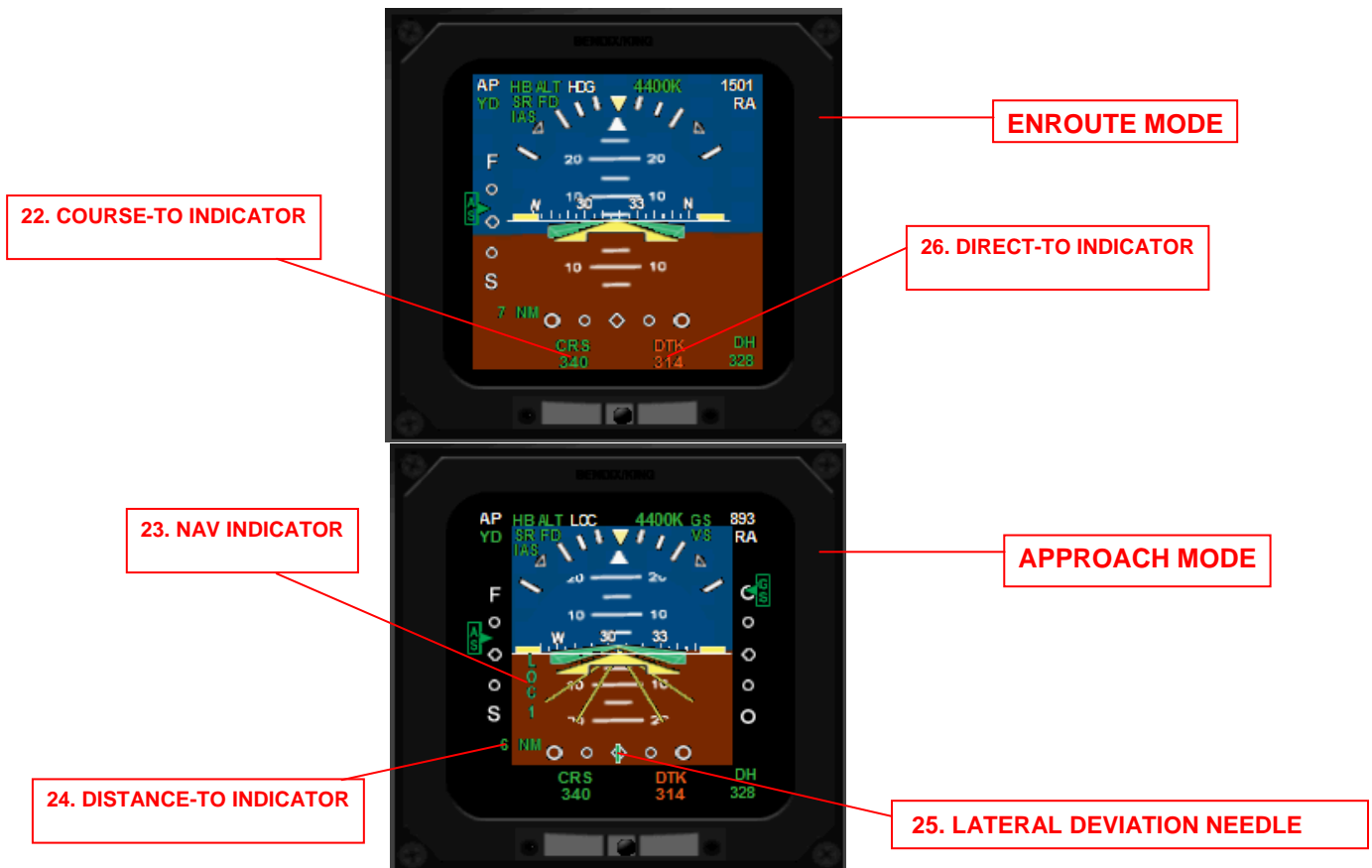
- 1. AP ANNUNCIATORS:** A series of annunciators are displayed along the top of the screen relating to autopilot functions and navigation information. The upper most left of the annunciators shows the status of the autopilot. A white AP is displayed if the autopilot master is on, blank if it is off. Just below this is the annunciator for the yaw dampener shown as a white (armed) or green (active) YD. The next 2 columns to the right display the status of many autopilot functions. This includes annunciators for the half-bank (HB), soft ride (SR), airspeed hold (IAS) , altitude hold (ALT), and flight director (FD) functions. If the corresponding button on the autopilot panel is on and the autopilot master is not engaged, these annunciators will be white (armed). If they are on and the autopilot is engaged, they will be green (engaged).
- 2. ROLL SCALE:** Stationary scale used with the bank pointer to show degrees of bank. Hash marks correspond to 10, 20, 30, 45, and 60 degrees of bank.
- 3. PITCH SCALE:** Vertical moving ladder scale used with the stationary symbolic aircraft to show aircraft pitch in degrees. Horizontal lines show differences of +/-10 degrees.
- 4. and 5. FS POINTER AND FS SCALE:** The fast/ slow pointer and scale are used as a visual reference of the current airspeed to the airspeed hold value (shown by the airspeed bug). They are not visible if the aircraft airspeed is more than +/-15 knots from the airspeed hold value. If the airspeed is above the hold value, the FS POINTER will be above the center circle of the FS SCALE, and if less than it will be below.
- 6. MARKER ANNUNCIATORS:** Marker status is displayed in a box at the bottom left of the screen. The outer marker annunciator is displayed in blue, the middle marker in brown, and the inner marker in white when the appropriate signal is received.
- 7. and 8. RT SCALE AND INDICATOR:** Horizontal movement of the RT INDICATOR points out the rate of turn on the RT SCALE.
- 9. TURN INDICATOR BALL:** Shows if aircraft is in level flight.
- 10. PERSPECTIVE LINES:** Slanted yellow vertical lines on the inner card face used in conjunction with the RISING RUNWAY to aid in keeping the aircraft aligned with the runway during approach and landing.

- 11. LATERAL DEVIATION RISING RUNWAY:** The rising runway is visible only in the standard approach screen. It is intended to provide both lateral and vertical flight information. It uses the LATERAL DEVIATION SCALE to function in the lateral plane as a typical CDI pointer that slides left or right of center to show the relative position of the aircraft to the signal. Lateral positioning is also aided by the PERSPECTIVE LINES. Vertical information comes from the vertical movement and size of the rising runway. The initial runway displayed when on approach is near the bottom of the display and is visible until 200 feet from the ground. From 200 feet on down to the ground the rising runway will move up the display and will become increasing larger.
- 12. LATERAL DEVIATION SCALE:** A standard CDI scale used in conjunction with the rising runway to provide lateral navigation information. The white triangles at the far right and left sides correspond to a deviation distance of 5 miles.
- 13. and 14. VERTICAL DEVIATION SCALE AND POINTER:** Standard vertical deviation scale and pointer used for vertical navigation. Indicates the relative vertical position of the aircraft to the glideslope. If the pointer is above the middle white circle the aircraft is below the glideslope, and if below the aircraft is above the glideslope.
- 15. VERTICAL NAV ANNUNCIATORS:** There are 2 annunciators, displayed in green when active, at the upper right side of the display that assist in vertical navigation. The glideslope annunciator (GS) is illuminated when a glideslope signal is received. The other annunciator (VS) indicates the vertical speed status, and is illuminated when the aircraft is ascending or descending.
- 16. DH ANNUNCIATOR:** A numerical display of the continue/abort decision height in feet above ground. This value is set by the pilot in the EFIS CONTROL PANEL (discussed later). If the aircraft goes below this altitude, a yellow outlined black box with the letters DH inside appears at the middle right of the display to indicate the fact.
- 17. SYMBOLIC AIRCRAFT:** A stationary reference point for obtaining lateral and vertical flight information from the vertical movement and roll of the "earth/sky" inner card. It also functions as a pointer for the HEADING TAPE.
- 18. FD COMMAND BAR:** The flight director consists of single cue command bars providing vertical information only. It is in the shape of a delta-wing.
- 19. HEADING TAPE:** Linear magnetic compass for quick directional awareness.

- 20. ROLL POINTER:** Rotates left and right and points to the degree of bank on the ROLL SCALE.
- 21. ROLL CENTER POINTER:** Reference point for the roll pointer. When the 2 are lined up the aircraft is in level flight.
- 22. LATERAL NAV ANNUNCIATORS:** The lateral nav annunciators show the type of current lateral navigation. They are white, and are located just to the right of the AP ANNUNCIATORS at the top of the display. Choices include NAV, HDG, LOC, and GPS.
- 23. ALTITUDE HOLD:** The autopilot altitude hold value is displayed in green at the top of the display just to the right of center. The value can be set with either the KAS 297C or the altitude indicator.
- 24. RA ANNUNCIATOR:** The radio altimeter height above ground is displayed in white in the upper right corner of the screen. It is only displayed when the aircraft is less than 2500 feet above the ground.

The enroute and approach formatted screens for the composite mode are shown below. Although composite modes are "reversionary" displays generally used when the primary system is not available, they can be used instead of the standard system if preferred. The primary difference between the 2 modes is the navigation information displayed. In the composite modes the rate of turn indicator scale and pointer are replaced with a standard CDI scale and pointer, complete with TO/FROM annunciation. The course and heading values are annunciated, color coded, at the bottom. The type of navigation in use is annunciated on the left side of the screen, and below it the distance to the station. Additionally, an orange heading bug and a green course arrow are displayed on the heading tape. No rising runway is presented in the composite approach mode.

17a: PFD COMPOSITE SCREEN



22. COURSE-TO INDICATOR: Green digital numeric readout of the set course direction.

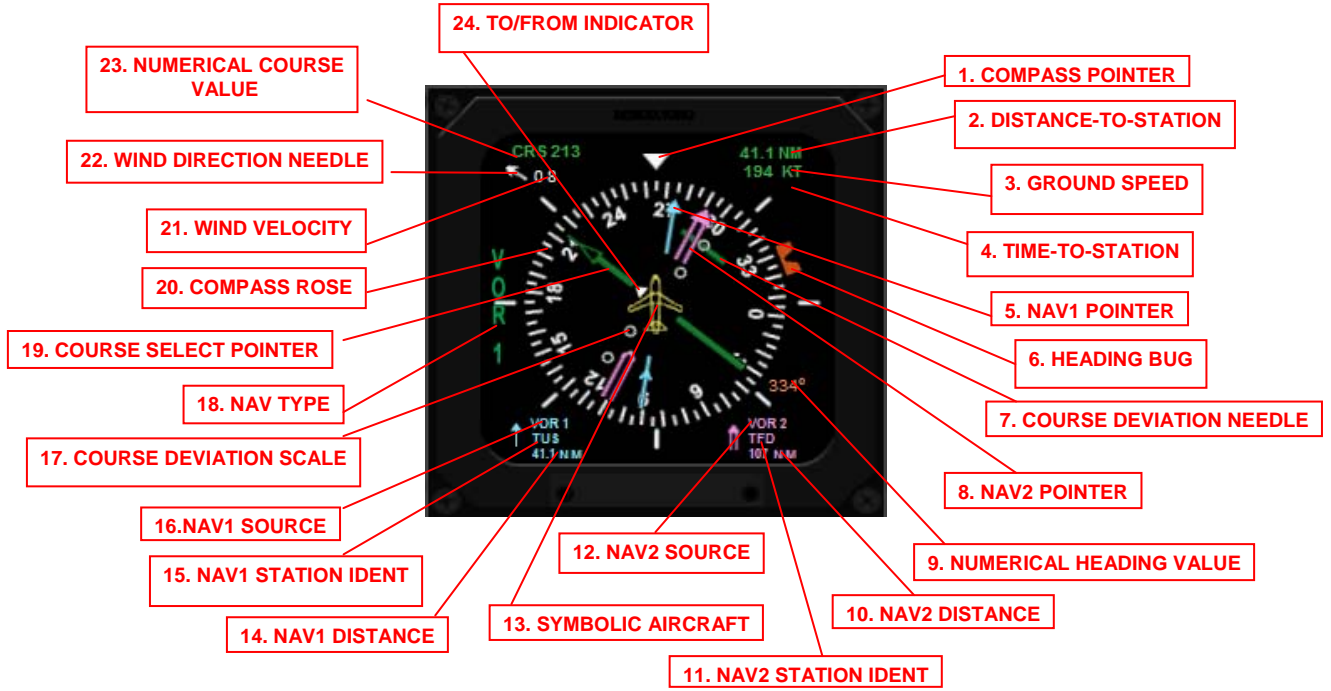
23. NAV INDICATOR: Displays the current type of lateral navigation in use. Choices include VOR1, VOR2, ADF1, and GPS.

24. DISTANCE-TO INDICATOR: This annunciator displays the current distance to the set station in nautical miles.

25. LATERAL DEVIATION SCALE AND POINTER: The same as described in #10 above with the exception the rising runway is replaced by a white outlined green LATERAL DEVIATION INDICATOR bar.

26. DIRECT-TO INDICATOR: Numeric read out of the magnetic direction to a station in direct-to navigation. Displayed in green.

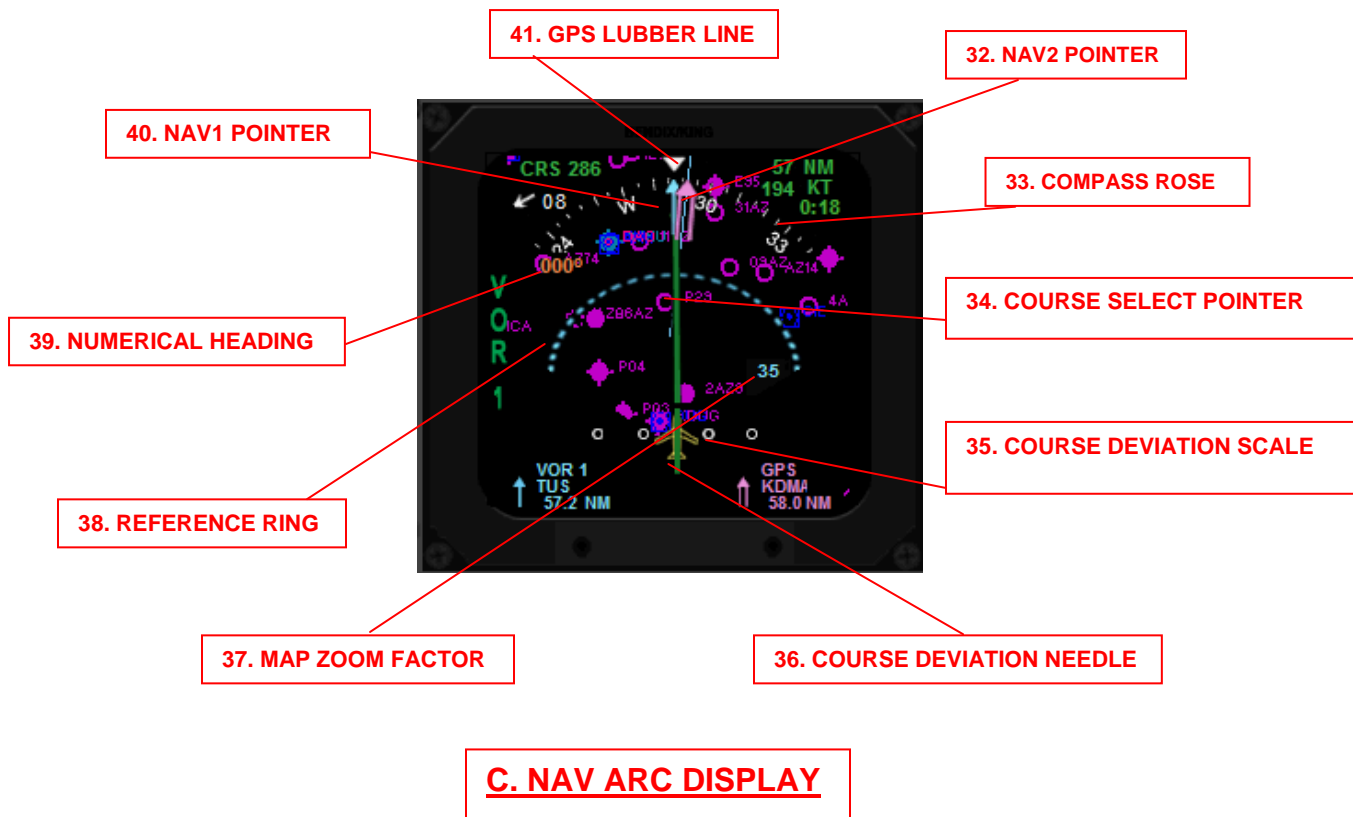
18. MUTIFUNCTIONAL DISPLAY



A. NAV HSI DISPLAY



B. NAV MAP DISPLAY



C. NAV ARC DISPLAY

The EFS50 is a multifunctional display (MFD) that provides the pilot with a wealth of navigational information in an easy to access, and easy to read display. This navigational information includes the identity, distance, direction, time on route, navigation type, vertical and horizontal navigation, and heading to name a few (discussed below). There are 3 screens available; the NAV HSI display, the NAV MAP display, and the NAV ARC display, shown as figures A, B, and C above, respectively. The basic differences between these 3 screens are that the NAV MAP and NAV ARC screens display a moving, zoomable map, and the NAV ARC screen displays the information in the context of an arc screen. The NAV HSI screen does not display a map, and the information is not displayed in an arc. The 3 screens, and the various displays within any of the screens, are changed by buttons on the CD467 control panel as discussed in the EFIS CONTROL panel section.

The information common to all 3 screens is grouped at each corner of the display. The upper left corner shows whether the navigation is Course or Direct, as well as the corresponding value. The wind direction and strength are also listed in this corner.

The upper right corner displays information pertaining to the current navigation. If the autopilot is on and set, it will change depending on the type of signal the unit is tracking and will be accompanied by a corresponding change in aircraft tracking. These changes

reflect changes in the aircraft navigation state rather than just changes in displayed information. The values are informational only if the autopilot is off.

The lower left, and lower right corners display Nav1 and Nav2 information, respectively. These are informational displays only; they do not reflect the navigational state of the aircraft, per se. The Nav1 set of information can be toggled to display VOR1, ADF1, or GPS1 information. The Nav2 set can be toggled between VOR2 and GPS2 (ADF2 if installed) information. A corresponding change in the Nav1 or Nav2 POINTER, the COURSE SELECT POINTER, and CDI/GS information will accompany the change.

In addition, the type of navigation source being tracked is annunciated along the middle of the left side of the display. Choices include VOR1, VOR2, ADF1, LOC (locator), and GPS. If a source is not being tracked, the type shown is in the "armed" position; i.e., the source of navigation when the autopilot is turned on.

Some of the information displayed on these screens correlate and are color coded. For example, NAV1 information is displayed in light blue and includes Nav1 type, station identity, distance-to station, Nav1 pointer, and next-station ident. The same information for Nav2 is displayed in magenta. The information sets in the upper right corner and on the middle left side are displayed in green to designate information regarding the current state of navigation.

Note: Functioning of the EFS50 is largely controlled by buttons on the EFIS control panel. To fully understand how the EFS50 functions it is important to read the accompanying literature about the EFIS control panel.

- 1. COMPASS POINTER:** Points out the aircraft heading on the COMPASS ROSE.
- 2. DISTANCE-TO-STATION:** Displays the distance to the navigation source listed at the middle left side, in nautical miles (excluding ADF1 and LOC). Displays current navigation state information if the autopilot is on.
- 3. GROUND SPEED:** Speed at which the aircraft is moving relative to the ground, in knots.
- 4. TIME-TO-STATION:** Displays the remaining time to the navigation source listed at the middle left side, in hours:minutes format (excluding ADF1 and LOC).
- 5. NAV1 POINTER:** Points to the direction of the Nav1 source on the COMPASS ROSE. Correlates to the Nav1 information at the bottom left and is displayed in light blue. Displayed as a "single shaft" hatched arrow in the NAV HSI and NAV MAP screens, and as a single arrow in the NAV ARC screen. Used to display information from a VOR1, ADF1, or GPS1 source.

- 6. HEADING BUG:** Rotates around the compass rose and is used to set a heading for the autopilot heading hold function. The bottom of the V notch points to the heading on the compass rose. Also can be used as a reference point for various navigational functions.
- 7. COURSE DEVIATION NEEDLE:** Used with the COURSE DEVIATION SCALE to show the current aircraft position relative to the desired course. A centered needle indicates the aircraft is on the desired track. If the needle is to the right of center, the aircraft is to the left of the track. Likewise, if the needle is to the left of center, the aircraft is to the right of the track. Also, when centered will guide the COURSE SELECT POINTER to the correct value. Works as part of the COURSE SELECT POINTER in the NAV HSI Screen; it is centered when aligned with the pointer. The course deviation needle is presented at the bottom of the compass rose as a typical left/right sliding CDI needle in the NAV MAP and NAV ARC screens.
- 8. NAV2 POINTER:** Points to the direction of the Nav2 source on the COMPASS ROSE. Correlates to the Nav2 information at the bottom right and is displayed in a magenta color. Displayed as a hatched arrow in the NAV HSI and NAV MAP screens, and as a single arrow in the NAV ARC screen. Used to display information from a VOR2, ADF2 (inactive), or GPS2 source. The Nav2 needle is presented as a "double shaft" arrow.
- 9. NUMERICAL HEADING BUG VALUE:** Digital, numerical display of the heading bug value, in degrees.
- 10. NAV2 DISTANCE:** Distance remaining to a Nav2 source, in nautical miles. Displays information only. Magenta in color to show association with other Nav2 information displays. Specific to the identity and Nav2 source listed below.
- 11. NAV2 STATION IDENT:** Displays the ICAO code of the Nav2 source being tracked. Displays information only. Magenta in color to show association with other Nav2 information displays.
- 12. NAV2 SOURCE:** Displays if the Nav2 source is of a VOR2, ADF2, or GPS type.
- 13. SYMBOLIC AIRCRAFT:** Stationary reference aircraft positioned to represent the longitudinal axis of the aircraft.
- 14. NAV1 DISTANCE:** Distance remaining to a Nav1 source, in nautical miles. Displays information only. Light blue in color to show association with other Nav1 information displays. Specific to the identity and Nav1 source listed below.
- 15. NAV1 STATION IDENT:** Displays the ICAO code of the Nav1 source being tracked. Displays information only. Light blue in color to show association with other Nav1 information displays.

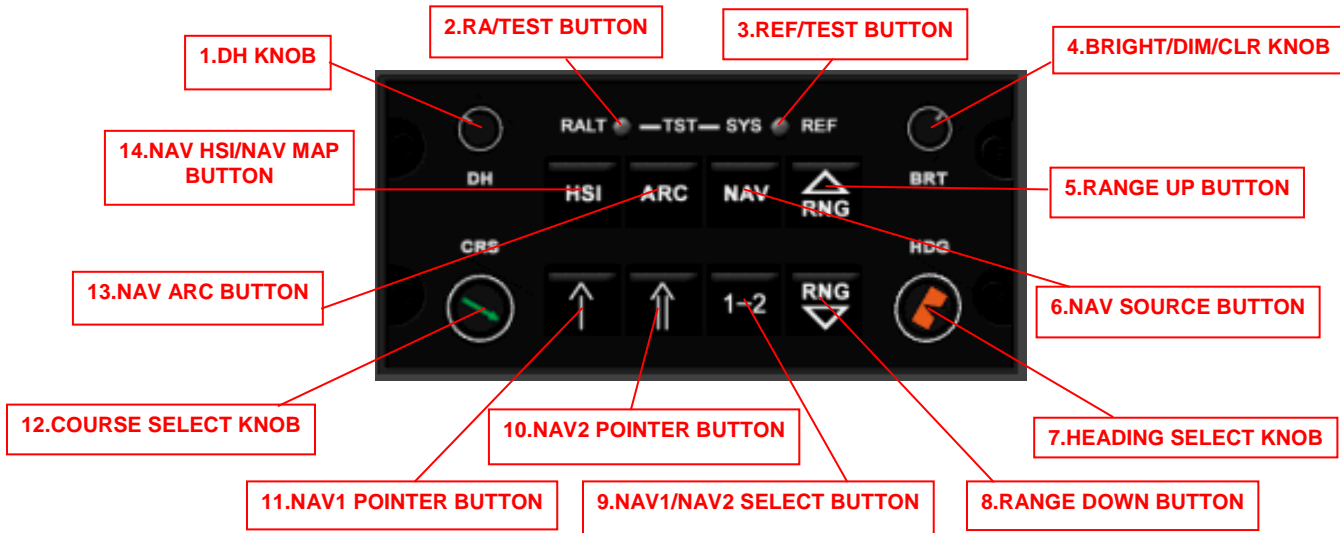
- 16. NAV1 SOURCE:** Displays if the Nav1 source is of a VOR1, ADF1, or GPS type.
- 17. COURSE DEVIATION SCALE:** Used with the COURSE DEVIATION NEEDLE to determine relative position to a desired course. Each symbol on the scale represents 2.5 nmiles off-center of the desired track..
- 18. NAV TYPE:** Displays the current type of active tracking when the autopilot is being used. Displays include VOR1, VOR2, ADF1, LOC, and GPS. Listing correlates with the information displayed in the upper right corner.
- 19. COURSE SELECT POINTER:** Points out the direction to the Nav source on the compass rose when the COURSE DEVIATION NEEDLE is centered. Displayed as a long green hatched arrow rotating around the center of the gauge in the NAV HSI screen. The course deviation needle slides left and right perpendicular to the pointer. The needle is centered when it "fills in" the pointer to make one continuous arrow. The course select pointer functions in the NAV MAP screen as in the NAV HSI screen, but is replaced by a green "course line" that rotates from the center of the display. The pointer does not interact directly with the course deviation needle as in the NAV HSI screen. The course select pointer is presented as a long solid green line in the NAV ARC screen that rotates from a point below the center. It is only visible in the arc part of the display.
- 20. COMPASS ROSE:** A standard 360 degree compass rose that rotates around its center point.
- 21. WIND VELOCITY:** Displays the current altitude wind velocity in knots.
- 22. WIND DIRECTION NEEDLE:** Displays the current altitude wind direction in degrees magnetic north.
- 23. NUMERICAL COURSE VALUE:** Displays a numerical readout of the course value in degrees magnetic north.
- 24. TO/FROM INDICATOR:** Indicates if OBS tracking is To or From a station.
- 25. RANGE RING:** A circular ring displayed to estimate map range distance.
- 26. COURSE SELECT LINE:** Displays the selected course direction during navigation relative to magnetic north.
- 27. COURSE DEVIATION NEEDLE:** See definition #7 above.

28. **COURSE DEVIATION SCALE:** See definition #17 above.
29. **PREVIOUS STATION IDENT:** Displays the identification code of the previous wpt of a flight plan. The ID code is displayed for all possible wpt types.
30. **NEXT STATION IDENT:** Displays the identification code of the next wpt if navigating by a flight plan, or the station ID code if tracking an OBS signal.
31. **TO/FROM INDICATOR:** See definition #24 above.
32. **NAV2 POINTER:** See definition #8 above.
33. **COMPASS ROSE:** See definition #20 above.
34. **COURSE SELECT POINTER:** See definition #19 above.
35. **COURSE DEVIATION SCALE:** See definition #17 above.
36. **COURSE DEVIATION NEEDLE:** See definition #7 above.
37. **MAP ZOOM FACTOR:** Displays the zoom factor of the moving map display on the NAV MAP and NAV ARC screens.
38. **REFERENCE RING:** See definition #25 above.
39. **NUMERICAL HEADING:** See definition #9 above.
40. **NAV1 POINTER:** See definition #5 above.
41. **GPS LUBBER LINE:** Displays the desired track of the aircraft from the origin to the destination wpt when navigating to a flight plan.

Instructions

1. The EFS 50 is information only with no direct user input. As discussed in the next section, the EFS 50 display is linked to the EFIS control panel.

19. CP 467 EFIS CONTROL PANEL



The Electronic Flight Inertial System panel is the "brains" behind navigation in this aircraft. The EFIS panel allows the user to choose between navigation types, including Nav1, Nav2, GPS, and ADF1, set the heading bug, set the course pointer, toggle between Nav1 and Nav2 directly, and to set the Decision Height (displayed in the PFD). This panel also contains the buttons to switch between the Nav, Map, and ARC modes of the EFS 50, to declutter the map, and to change the map range. You can also set the heading bug directly to the current heading of the aircraft, or set the COURSE SELECT pointer directly to a received signal, at the click of a button.

Changes made to navigation in the EFIS panel are reflected by changes in the navigation indicators displayed on the EFS 50 screen as discussed in the EFS 50 section. In addition, you can toggle between different information states on the EFS 50 without changing the navigational state. A bright/dim knob allows the user to change the level of brightness of both the PFD and EFS50 screens. Buttons for testing the Radio Altimeter, and for self testing are also located on this panel.

1. DH KNOB: Changes the Decision Height value. The value is displayed on the EFS 40 screen. Clicking on the right side of the knob increases the value, and clicking on the left side decreases it.

2. **RA/TEST BUTTON:** Tests for proper functioning of the Radio Altimeter. Clicking on this button will cause the button to illuminate white, and the decision height annunciations on the PFD to enlarge. If the test is passed, the annunciators and light will go back to normal in 2 seconds.
3. **REF/TEST BUTTON:** Performs a self test protocol for 2 seconds when pressed. The button will illuminate white during this period, and will go off if the test is passed.
4. **DIM/BRT/CLR BUTTON:** Used to change the brightness level of the EFS 40 and 50 screens. Clicking on the right side increases brightness, and clicking on the left side decreases it. Also functions to de-clutter and/or turn off the map display in the EFS 50 NAV MAP and NAV ARC modes by clicking on the center of the button.
5. **RANGE UP BUTTON:** Used to zoom in on the map in the NAV MAP and NAV ARC modes of the EFS 50. Values available range from 200 feet to 500 miles. The range factor is displayed on the EFS 50 as discussed in that section.
6. **NAV SOURCE BUTTON:** Used to sequentially switch between different types of navigation. Repeated clicks on the button brings up the choices which includes (in order), Nav1, Nav2, GPS, and ADF1. Clicking in the ADF1 mode will cycle back to the Nav1 mode. It is important to note that if the autopilot Nav or HDG function is on, the aircraft will start to navigate as directed by the navigation type chosen with this button. These changes will be reflected on the EFS 50 screen.
7. **HEADING SELECT KNOB:** Changes the heading bug setting, as displayed on the EFS 50. Click on the right side of the button to increase the value, and on the left to decrease it. Clicking in the middle of the button will slew the heading bug to the current aircraft heading. Also changes the digital heading readout on the EFS 50. (Note: if the autopilot and HDG functions are on, the aircraft will immediately start tracking the new setting.)
8. **RANGE UP BUTTON:** Used to zoom out on the map in the NAV MAP and NAV ARC modes of the EFS 50. Values available range from 200 feet to 500 miles. The range factor is displayed on the EFS 50 as discussed in that section.
9. **NAV1/NAV2 SELECT BUTTON:** Used to toggle directly between Nav1 and Nav2 navigation sources. It is important to note that if the autopilot Nav function is on the aircraft will start to navigate as directed by the navigation type chosen with this button. If the autopilot is off, the button can be used to display information from either Nav source.
10. **NAV2 POINTER BUTTON:** Used to toggle between different Nav2 information displays on the EFS 50 screen. Information sources include VOR2, ADF and GPS. The information includes the display at the bottom right corner the screen in magenta, and the magenta Nav2 double arrow pointer. This button only changes the information displayed, it does not change the navigational state of the flight.

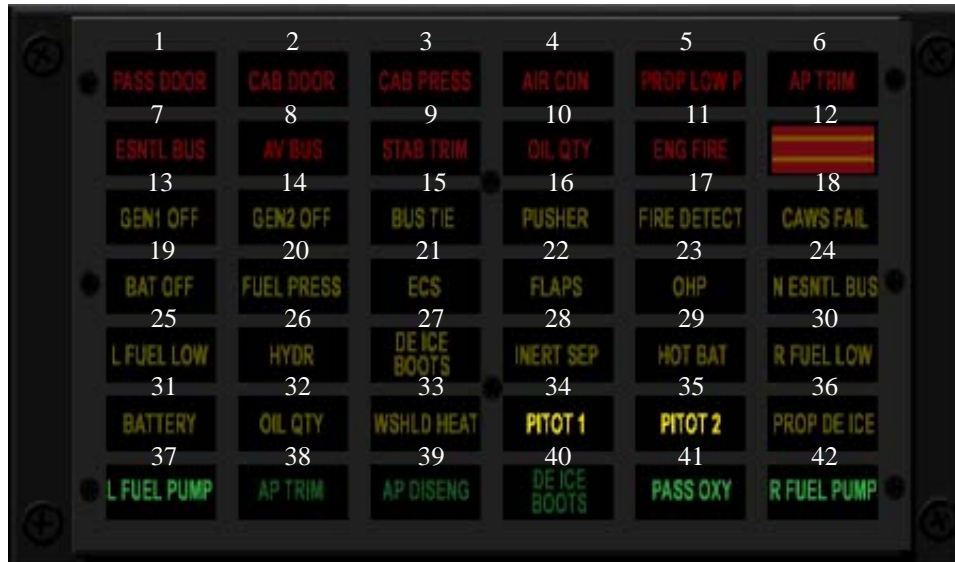
- 11. NAV1 POINTER BUTTON:** Used to toggle between different Nav1 information displays on the EFS 50 screen. Information sources include VOR1, ADF1, and GPS. The information includes the display at the bottom left corner of the screen in light blue, and the light blue Nav1 single arrow pointer. This button only changes the information displayed, it does not change the navigational state of the flight.
- 12. COURSE SELECT KNOB:** Changes the course select value setting as displayed on the EFS 50. Click on the right side of the button to increase the value, and on the left to decrease it. Clicking in the middle of the button will slew the COURSE SELECT POINTER directly to the current selected course, and will center the COURSE DEVIATION NEEDLE within the pointer. Also changes the digital course select readout in the upper left corner of the EFS 50.
(Note: if the autopilot and NAV functions are on, the aircraft will immediately start tracking the new setting.)
- 13. NAV ARC BUTTON:** Used to toggle the NAV ARC mode on and off. Default setting is off. (note: the NAV ARC mode is also turned off by the NAV HSI/NAV MAP BUTTON.)
- 14. NAV HSI/NAV MAP BUTTON:** Toggles the EFS 50 mode between NAV HSI and NAV MAP displays. Also turns off the NAV ARC mode directly. The NAV HSI mode is set as default.

INSTRUCTIONS:

- 1.** Rotate the BRIGHT/DIM/CLR BUTTON to set the brightness level of the PFD and EFS 50 if desired.
- 2.** Perform Radio Altimeter and self tests.
- 3.** Use the DH KNOB to set the desired Decision Height if desired.
- 4.** Set the heading bug and course direction using the HEADING and COURSE SELECT KNOBs, respectively.
- 5.** Use the NAV1 and NAV2 pointer buttons to display the desired information on the EFS 50 screen.
- 6.** Use the NAV HSI/NAV MAP and NAV ARC buttons to display the desired screen.
- 7.** If the EFS 50 is in the NAV MAP or NAV ARC mode, use the RANGE UP and RANGE DOWN BUTTONS to select the desired range, or zoom, factor. Use the BRIGHT/DIM/CLR BUTTON to de-clutter or turn off the map function.

8. Use the NAV SOURCE BUTTON to select navigation type. Usually, this is the navigation source you want to track when the autopilot is turned on. If the autopilot is off, the button is used to display information from the selected source.
9. Use the NAV1/NAV2 SELECT BUTTON to switch between NAV1 and NAV2 displays, without cycling through the GPS and ADF displays if desired.
10. The HEADING SELECT, COURSE SELECT, NAV SOURCE, and NAV1/NAV2 SELECT BUTTONS can be toggled at any time. However, if the autopilot is set for navigation, changing any of these buttons will cause the aircraft to change its current navigation state to the new one.

20. CAWS PANEL



The Crew Advanced Warning System is an advisory panel that provides valuable information about the physical state of the aircraft systems. The CAWS panel is composed of a series of annunciators that illuminate under certain pre-set conditions. Some of the annunciators, like the L FUEL PUMP simply indicate whether the function is on or off. Others, like the OIL QTY annunciator indicate when the amount of some variable is below or above a certain predetermined value. The annunciators are color coded according to the importance, or seriousness of the variable. The annunciators in green are of a status indicator, in yellow a caution, and in red an urgent nature. With this information at hand, the situational awareness of the crew, and therefore the safety of the flight, is significantly increased.

1. **PASS DOOR:** On when the passenger door is open.
2. **CAB DOOR:** On when the cabin door is open.
3. **CAB PRESS:** On when cabin pressure is less than optimal.
4. **AIR GND:** Illuminates if left and right AIR/GND switches are in disparity.
5. **PROP L PRESS:** On when the prop pitch is below minimum in-flight pitch (in air).

6. **AP TRIM:** On when the degrees of trim is greater than 12 degrees or less than -12 degrees.
7. **ESNTL BUS:** On when the ESNTL bus voltage is non-functioning.
8. **AV BUS:** On when the avionics bus is below 22 VDC (volts direct current).
9. **STAB TRIM:** On if the stab trim is greater than degrees from set.
10. **OIL QTY:** On when the oil quantity is below 8 quarts.
11. **ENG FIRE:** On if smoke is detected in the engine compartment.
12. **Unused**
13. **GEN1 OFF:** On when the generator 1 voltage output is less than 20 VDC.
14. **GEN2 OFF:** On when the generator 2 voltage output is less than 20 VDC.
15. **BUS TIE:** On if the main bus tie relay is open.
16. **PUSHER:** System malfunction.
17. **FIRE DETECT:** On if smoke is detected in the cabin compartment.
18. **CAWS:** On if an internal CAWS failure occurs.
19. **BATT OFF:** On when the battery is off line.
20. **FUEL PRESS:** On when the fuel pressure is below 2 psi.
21. **ECS:** On when the ECS fails or no bleed air is detected.
22. **FLAPS:** On when the flaps angle is greater than 0 and the IAS is greater than 130 knots.
23. **OHP:** On when the overhead panel is displayed.
24. **N ESNTL BUS:** On when the N ESNTL bus voltage is less than 22 VDC.
25. **L FUEL LOW:** On when the quantity of fuel in the left fuel tank has less than 20 US gallons (135 lbs.) of fuel remaining.
26. **HYDR:** On when the hydraulic pressure falls below 1800 psi.

27. **DE ICE BOOTS:** On when the system malfunctions during cycling.
28. **INERT SEP:** On when the separator malfunctions.
29. **HOT BATTERY:** On when the battery voltage is above 29.6 VDC or greater than a 60 Amp discharge.
30. **R FUEL LOW:** On when the quantity of fuel in the right fuel tank has less than 20 US gallons (135 lbs.) of fuel remaining.
31. **BATTERY:** On when the battery voltage output is less than 22 VDC.
32. **OIL QTY:** On when the oil quantity is below 10 quarts
33. **WSHIELD HEAT:** On when the LH or RH windshield heat fails to turn on.
34. **PITOT 1:** On when pitot tube 1 heat is on.
35. **PITOT 2:** On when pitot tube 2 heat is on.
36. **PROP DE-ICE:** Indicates the prop de-ice system is on.
37. **L FUEL PUMP:** On when the left fuel boost pump is operating.
38. **AP TRIM:** On when the elevator trim position is greater than 6 degrees.
39. **AP DISENGAGE:** On when the autopilot is engaged.
40. **DE_ICE BOOTS:** On when the de-ice system is on.
41. **PASS OXY:** On when the air density is less than at 12,000 feet ASL.
42. **R FUEL PUMP:** On when the right fuel boost pump is operating.

INSTRUCTIONS:

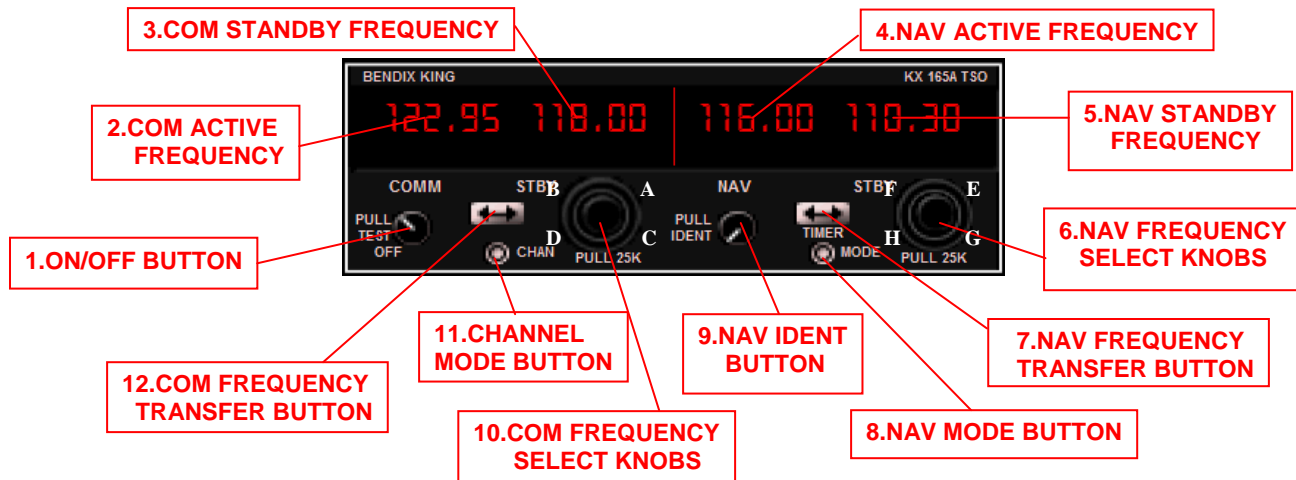
1. Place the CAWS panel anywhere on the panel by clicking and dragging.

20a. CAUTION AND WARNING ANNUNCIATORS



The Caution and Warning Annunciators Buttons are located above the PFD and indicate when an annunciator on the CAWS panel has been triggered. These 2 annunciators are color code matched to the CAWS panel annunciators. They "advise" the user to view the CAWS panel to determine the source of the problem. These annunciators allow the pilot to concentrate more fully on other aspects of the flight. They can be reset by clicking on the buttons.

21. KX 165A VHF COMM/NAV TRANSCEIVER



The KX 165A Transceiver is a communication and navigation radio. Two frequencies, active and standby, are available for both communications and navigation. Frequencies are typically entered into the standby frequency, and then exchanged with the active frequency to become active by using the COM or NAV FREQUENCY TRANSFER BUTTONS. There is also a "direct tune" mode which allows the user to change either the Com or Nav active frequencies directly. There is a PAGE mode and a CHANNEL mode for communications that allows the user to store up to 6 Com frequencies which can be exchanged directly with the active frequency at the click of a button. In addition, OBS, bearing-to, radial-from, count-up and count-down timer modes are available for navigation.

All of the controls for the radio are located on the front of the radio. The displays and controls for the communication functions are presented on the left side of the unit, the displays and controls for the navigation functions are on the right side. Communication controls include the COM FREQUENCY TRANSFER BUTTON, the CHANNEL MODE BUTTON, and the COM FREQUENCY SELECT KNOBS. Navigation controls include the NAV FREQUENCY TRANSFER BUTTON, the NAV MODE BUTTON, and the NAV FREQUENCY TRANSFER BUTTONS. All of the communications functions, excluding the display of the active frequency, are displayed at the location of the COM STANDBY FREQUENCY. Similarly, all navigation functions are displayed at the location of the NAV STANDBY FREQUENCY.

1. ON/OFF BUTTON: Powers the unit on and off.

2. **COM ACTIVE FREQUENCY:** Digital display of the active communications frequency.
3. **COM STANDBY FREQUENCY:** Digital display of the standby communications frequency.
4. **NAV ACTIVE FREQUENCY:** Digital display of the active navigation frequency.
5. **NAV STANDBY FREQUENCY:** Digital display of the standby navigation frequency.
6. **NAV FREQUENCY SELECT KNOBS:** An outer and an inner knob. The outer knob increments/decrements the navigation frequency in 1 MHz steps, and the inner knob increments/decrements in 50 kHz steps. The outer knob is increased by clicking on the letter E at the upper right side of the knob and decreased by clicking on the letter F at the left. The inner knob is increased by clicking on the letter G at the bottom right, and decreased by clicking on the letter H at the bottom left.

The NAV FREQUENCY SELECT KNOBS are also used to enter count-down values in the count-down mode. The outer knob increments/decrements the time in 1 minute steps. The inner knob increments/decrements time in 1 second steps. Click spots are the same as above.

The NAV FREQUENCY SELECT INNER KNOB has 2 positions, an out and an in position. Clicking directly on the button will toggle between these 2 positions. The out position is the default position. Functions requiring the out position include entry into the direct tune mode, active and standby Nav frequencies exchange in the OBS, bearing, and radial modes, resetting the count-up timer, and entering and exiting the count-down timer mode. Functions requiring the in position include active and standby Nav frequencies exchange in the default screen, direct active frequency change in the OBS, bearing and radial modes, and entering data, stopping, and resetting the count-down timer.

7. **NAV FREQUENCY TRANSFER BUTTON:** This button is used primarily to exchange the active and standby navigation frequencies. In the default screen the NAV FREQUENCY SELECT INNER KNOB must be in the "in" position, and in the "out" position in the OBS, bearing, and radial modes for the exchange to occur. This button is used to enter the direct tune mode, to reset the count-up timer, and to stop and/or reset the count-down timer. It is also used to enter and exit the count-down timer mode.

8. **NAV MODE BUTTON:** Used to sequentially step through the different navigation screens. Clicking the button at the last screen will "wrap around" to open the default screen.
9. **NAV IDENT BUTTON:** Turns on Nav IDENT when toggled to the out position. The corresponding Nav "on" annunciator on the GMA 340 will illuminate.
10. **COM FREQUENCY SELECT KNOBS:** An outer and an inner knob. The outer knob increments/decrements the communications frequency in 1 MHz steps, and the inner knob increments/decrements in 25 kHz steps. The outer knob is increased by clicking on the letter A at the upper right side of the knob and decreased by clicking on the letter B at the left. The inner knob is increased by clicking on the letter C at the bottom right, and decreased by clicking on the letter D at the bottom left.

The COM FREQUENCY SELECT KNOBS are also used to enter frequency values in the direct tune and page modes. The knobs increment/decrement the values as discussed above. The inner, kHz knob, is also used to step through the pages and channels of the page and channel modes, respectively.

11. **CHANNEL MODE BUTTON:** Used to enter and exit the page and channel modes.
12. **COM FREQUENCY TRANSFER BUTTON:** This button is used primarily to exchange the active and standby communications frequencies. No other buttons are required for the exchange. This button is also used to enter the direct tune mode, and to allow the entering of frequencies in the page mode.

INSTRUCTIONS:

1. Power the unit on by clicking the ON/OFF BUTTON.
2. Set Com and Nav frequencies using the COM- and NAV- FREQUENCY SELECT KNOBS, respectively. The active frequencies can be entered in 2 ways: 1) dial the desired number in as the standby frequency and then click on the COM or NAV FREQUENCY EXCHANGE BUTTON to place the entered number into the active frequency, (note: the NAV FREQUENCY SELECT KNOB must be in the "in" position to exchange the Nav frequencies), or 2) hold the COM or NAV FREQUENCY EXCHANGE BUTTON down longer than 2 seconds and enter the value directly into the active frequency (direct tune). The standby frequency is not displayed in the direct tune mode. Click the exchange button again to exit the direct tune mode. The standby frequencies can be entered directly using the appropriate knobs.

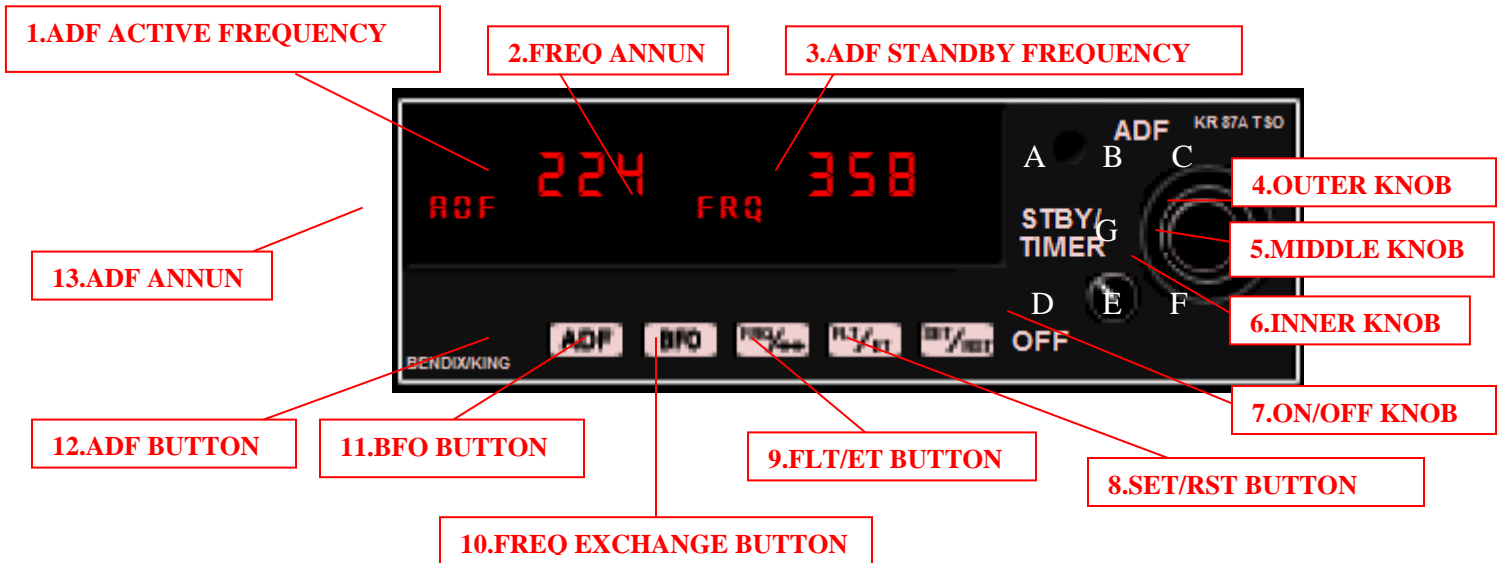
3. Enter Com frequencies into storage for later easy retrieval, up to 6 frequencies can be stored. The frequencies are entered in the PAGE mode. To enter the PAGE mode, hold the CHANNEL MODE BUTTON down for longer than 2 seconds. There is a "PG *" (* denotes page number) annunciation to show you are in the PAGE MODE, and at this time a semitransparent rectangle behind the annunciation. There are now 2 choices: 1) click on the COM FREQUENCY EXCHANGE BUTTON to enter numbers using the COM FREQUENCY SELECT KNOB. In this data entry state the rectangle behind the PG * annunciation will disappear and a larger rectangle will appear behind the frequency numbers. Click again on the COM FREQUENCY EXCHANGE BUTTON to exit the entry state, the large rectangle will disappear and the smaller rectangle behind the PG * annunciations will reappear. or 2) sequentially step up or down through the different pages in the PAGE mode by clicking on the inner, kHz, knob (letters C and D in the above picture). Click on the CHANNEL MODE BUTTON to exit the PAGE mode.
4. Numbers are entered into the specific pages by going to that page, and then entering them as discussed above. You cannot change pages when in the data entry state. The PG * annunciation and the rectangle behind it indicates that you are in the PAGE mode and that you can step through the pages. The rectangle behind the frequency, and the PG * annunciation, shows you are in the data entry state of the PAGE mode. Clicking on the CHANNEL MODE BUTTON while in the PAGE mode data entry state will take you directly to the CHANNEL mode, clicking on the CHANNEL MODE BUTTON again takes you back to the default screen and enters the number into the standby frequency.
5. When desired, the stored frequencies can be retrieved and placed into the active frequency by going into the CHANNEL mode. This is done by clicking on the CHANNEL MODE BUTTON for less than 2 seconds. A "CH *" annunciation will appear with a semitransparent rectangle behind it to show you are in the CHANNEL mode. The number displayed is the CHANNEL mode number and corresponds directly to a specific PAGE mode number. Use the inner, kHz, COM FREQUENCY SELECT KNOB (click spots C and D) to step sequentially through the channel pages. You can now enter that number into the standby frequency by clicking again on the CHANNEL MODE BUTTON and then entering it as the active frequency by clicking on the COM FREQUENCY EXCHANGE BUTTON. Clicking on the CHANNEL MODE BUTTON will also take you out of the CHANNEL mode back to the default screen.

6. The different NAV pages can be sequentially viewed using the NAV MODE BUTTON. Each click of the button steps the display to the next page, and the last click recycles the pages back to the first page. The active Nav frequency can be directly changed in the OBS, BEARING, RADIAL, and Timer pages by clicking on the NAV FREQUENCY SELECT KNOB and then using the knob to enter the new value. When entering data there is a rectangle behind the active frequency to indicate you are in the data entry state. The active frequency can be exchanged in these pages by clicking the NAV FREQUENCY EXCHANGE BUTTON.
7. In the default page, click the NAV MODE BUTTON once to get to the OBS page. The OBS page displays a typical CDI with a needle that shifts left or right depending on the relative position of the aircraft to a received signal. Centering the CDI needle using the EFIS CONTROL PANEL will also center the needle in the KX 165A. A TO or FROM annunciation will be displayed in the center of the CDI scale if a DME signal is being tracked. Also, the direction to the signal will be displayed in the standby frequency location. A dashed horizontal line and the word FLAG is displayed if no signal is received. If the signal is from a localizer, the direction annunciation is replaced by the letters LOC.
8. Click on the NAV MODE BUTTON once again to get to the BEARING page. This page displays the bearing to or from a received signal station. The value is in degrees magnetic north. When tracking to a station the letters TO will be annunciated.
9. Clicking the NAV MODE BUTTON again brings up the RADIAL page. The radial page displays the radial in degrees magnetic north from the station. The letters FR will be annunciated to show that tracking is occurring.
10. Click the NAV MODE BUTTON again to get to the timer page. The timer is displayed in a min:sec format. The default page shows the count-up timer. If the timer has not been reset, the time shown will be the time passed from when the unit was powered up. The count-up timer can be reset to 0 by clicking on the NAV FREQUENCY EXCHANGE BUTTON. Depressing the NAV FREQUENCY EXCHANGE BUTTON for longer than 2 seconds when the NAV FREQUENCY SELECT KNOB is in the out position will stop the count-up timer and bring up the count-down timer. When entering this page, there is a rectangle over the time display showing the readiness to enter a value to count down from. Enter the value desired using the NAV FREQUENCY SELECT KNOB. (note: the NAV FREQUENCY SELECT KNOB must be in the out position to enter data into the count-down timer, else the knob will be used to change the active frequency). Click on the NAV FREQUENCY EXCHANGE BUTTON to start the countdown. When the count-down has started, clicking on the NAV FREQUENCY SELECT KNOB will reset the value back to the value entered. The count-down timer is stopped by clicking on the

NAV FREQUENCY EXCHANGE BUTTON again. To exit the count-down timer page and return to the count-up timer page, hold down the FREQUENCY EXCHANGE BUTTON for longer than 2 seconds.

- 11.** Clicking the NAV MODE BUTTON again will get you back to the main Nav page.

22. KR 87A ADF RADIO



The Bendix/King KR 87A ADF Receiver provides the user with accurate bearing-to-station directions using frequencies between 200 and 1799 kHz. Features include an easy to read digital display of information, ADF and BFO tuning (BFO inactive), selection of active or standby frequencies with the click of a button, flight timer, count-up timer, and a count-down timer. The various annunciators are displayed to indicate displayed information.

1. **ADF1 ACTIVE FREQUENCY:** Digital display of the active ADF frequency. Can be exchanged with the standby frequency using the **FREQ EXCHANGE BUTTON**.
2. **FREQ ANNUN:** Annunciator light to indicate the default screen is displayed. It is off when any of the timer pages are displayed. Either **FLT** or **ET** will be displayed on the right side of the screen when in one of the timer modes.
3. **ADF1 STANDBY FREQUENCY:** Digital display of the ADF standby frequency. Can be exchanged with the active frequency using the **FREQ EXCHANGE BUTTON**.
4. **OUTER KNOB:** Increments and decrements the active or standby ADF frequencies in steps of 100 between 200 and 1700 kHz. Also used to set minutes of count-down time in the count-down timer mode. Click on the letter A to increase the value, and on the letter D to decrease it. (Note: the **INNER KNOB** must be pulled out to set the count-down time.)



5. **MIDDLE KNOB:** Increments and decrements the active or standby ADF frequencies in steps of 10 between 10 and 100 kHz. It is inactive in the count-down timer mode. Click on the letter B to increase the value, and on the letter E to decrease it.
6. **INNER KNOB:** Increments and decrements the active or standby ADF frequencies in steps of 1 between 0 and 10 kHz. Also used to set seconds of count-down time in the count-down timer mode. Click on the letter C to increase the value, and on the letter F to decrease it. This knob has an inner position (default) and an outer position (used in the count-down timer mode to enter numbers). Click on the letter G to toggle the knob between these positions. (Note: this knob must be pulled out to set the count-down time.)
7. **ON/OFF KNOB:** Powers the unit on and off.
8. **SET/RST BUTTON:** Used in the count-up and count-down timer modes. Resets the count-up time to 0 when depressed for less than 2 seconds. Used to enter the count-down mode by depressing for longer than 2 seconds. Also used in the count-down timer mode to start/stop (INNER KNOB out) and reset (INNER KNOB in) the time.
9. **FLT/ET BUTTON:** Toggles between the Flight Time and Elapsed Time Modes. The flight timer starts automatically when the unit is powered on, and can only be stopped or reset by turning the power on or off. The elapsed mode contains the count-up and count-down timers. The count-up timer can be reset to 0 by clicking on the SET/RST BUTTON, but cannot be stopped.
10. **FREQ EXCHANGE BUTTON:** Used to exchange the active and standby frequencies with the click of a single button. Also used to exit the timer modes to get back to the default screen.
11. **BFO BUTTON:** Toggles the BFO mode on and off (inactive).
12. **ADF BUTTON:** Toggles between the ADF and ANT modes. In the ADF mode the knobs are used to set the frequency. In the ANT mode the buttons are used to move the antenna for better reception (inactive).
13. **ADF ANNUN:** Annunciates the letters "ADF" when in the ADF mode, and the letters "ANT" when in the antenna mode.

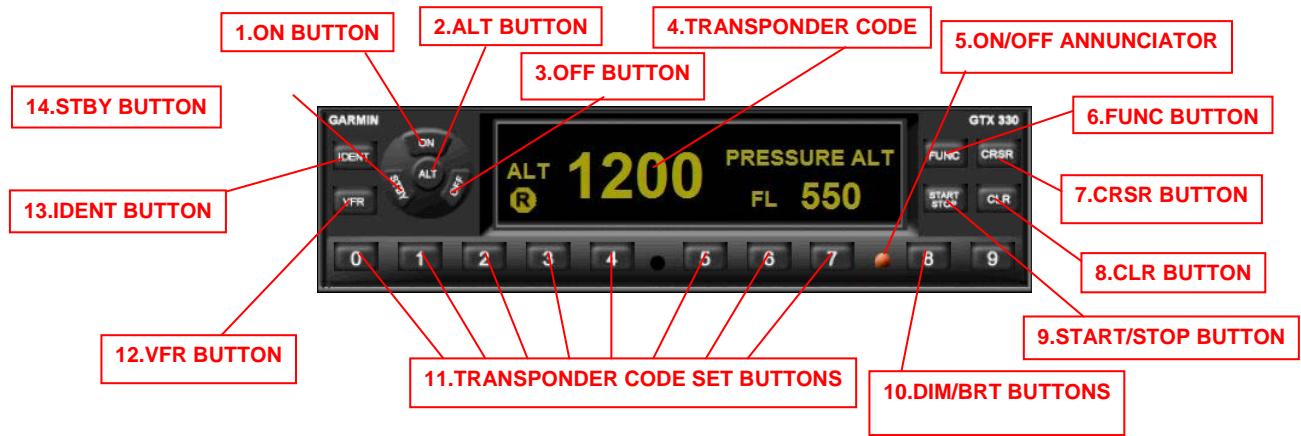
INSTRUCTIONS:

1. Power the unit on by clicking the ON/OFF BUTTON.



2. Use the outer, middle, and inner knobs to enter the desired active frequency into the standby frequency. Click on the **FREQ EXCHANGE BUTTON** to set the frequency just entered as the active frequency. If in a timer mode, you have to click the button twice: once to exit the timer mode and once to exchange.
3. To set the count-up timer, click on the **FLT/ET BUTTON** when in the default screen to get to the flight timer screen. The **FRQ** annunciation in the middle of the screen will go off and the letters **FLT** will be displayed at the top right hand of the screen. The standby frequency display will also disappear. Click the **FLT/ET BUTTON** again to go into the count-up screen of the time mode. The **FLT** annunciation will go off and the letters **ET** will appear at the bottom right hand of the screen. Click on the **SET/RST BUTTON** to set the time back to 0 at any time.
4. To set the count-down timer, depress the **SET/RST BUTTON** for longer than 2 seconds while in the elapsed time mode. The count-down timer will be stopped with the current count-down time displayed. Click on the **INNER KNOB** (on letter **G**) to get it in the "out" position. Use the **OUTER** and **INNER KNOBS** to set the minutes (letters **A** or **D**) and seconds (letters **C** and **F**), respectively. Clicking on the **SET/RST BUTTON** at this time, with the **INNER KNOB** out, will toggle the timer to start (and stop). If the **INNER KNOB** is clicked back to the "in" position, with the timer started, clicking on the **SET/RST BUTTON** will cause the timer to reset to the entered value but will not stop it.
5. When in a timer mode, the active frequency can be directly entered and changed using the outer, middle, and inner knobs without going through the standby frequency. The only exception is when you are entering numbers into the count-down timer, i.e., when the **INNER KNOB** in the "out" position in the count-down mode.
6. Click on the **FLT/ET BUTTON** to go to the flight screen, or click on the **FREQ EXCHANGE BUTTON** to exit the timer mode.
7. Power off the unit by clicking on the **ON/OFF BUTTON**.

23. GARMIN GTX 330 TRANSPONDER



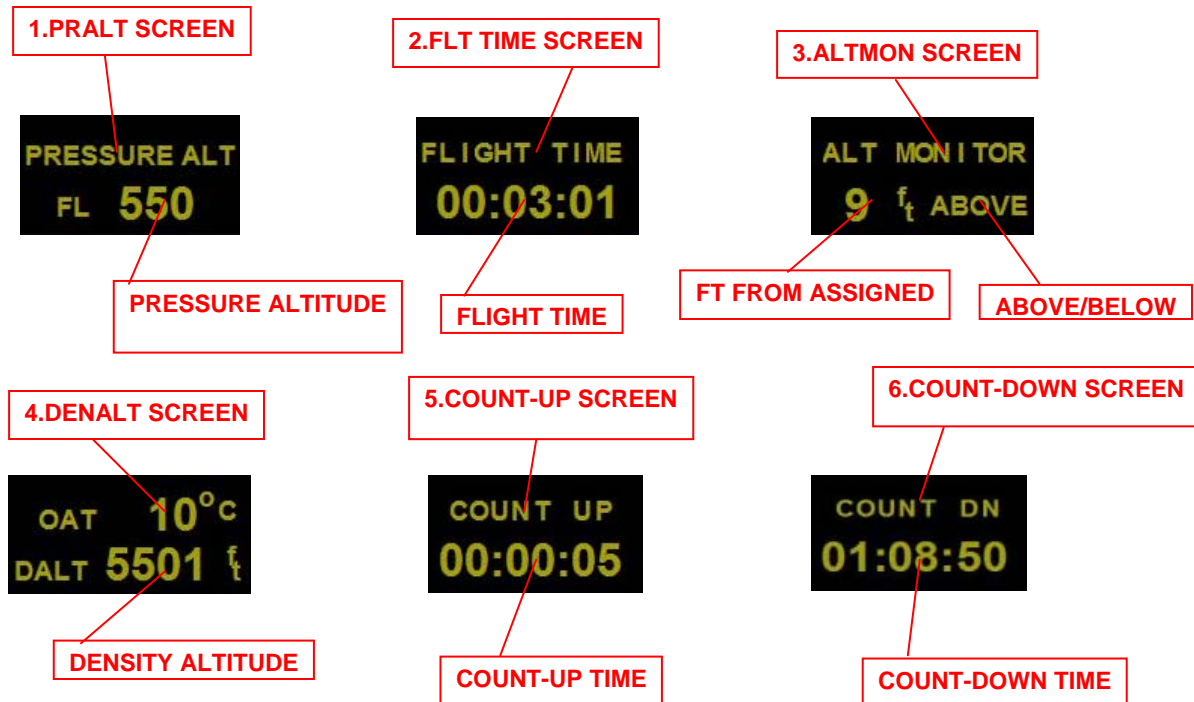
The Garmin GTX 330 transponders primary function is to transmit a 4 digit code that is used to locate the aircraft. The code is set using the TRANSPONDER CODE SET BUTTONS. This is done by clicking the desired numbers directly, and does not involve the use of any other buttons. In addition, there is a VFR BUTTON that sets the code to 1200 when clicked.

The GTX 330 transponder also provides the user with altitude and timer information. These functions are shown on the right side of the screen (see figures below). Clicking on the FUNC BUTTON sequentially displays pressure altitude, flight time, altitude monitor, outside ambient temperature and density altitude, a count-up timer, and a count-down timer.

1. **ON BUTTON:** Powers the transponder unit on. Selects Mode A. In this mode the unit will respond to interrogations, but will not receive altitude information.
2. **ALT BUTTON:** Powers the transponder unit on. Selects Mode A and C. Both interrogation and altitude information will be received.
3. **OFF BUTTON:** Turns the transponder off.
4. **TRANSPONDER CODE:** Digital display of the set transponder code.
5. **ON/OFF ANNUNCIATOR:** When lit indicates the transponder is on.
6. **FUNC BUTTON:** The function button is used to scroll through the different function screens on the right side of the screen (screens listed above).

- 7. CRSR BUTTON:** This button has 2 functions. It is used to cancel transponder code and count-down entries, and to allow input data in the count-down mode. Clicking the CRSR BUTTON when in the count-down screen allows a time value to be entered using the 9 number buttons at the bottom (instead of changing the transponder code). The count-down timer must be stopped and reset (click on CLR BUTTON) before entering a new value.
- 8. CLR BUTTON:** Resets the flight and count-up timers to 0, and resets the count-down timer to the entered value. Also used to cancel previous keypress entries during transponder code and count-down value selections.
- 9. START/STOP BUTTON:** Starts and stops the altitude monitor, count-up, count-down, and flight timers. Restarting the timers will start at the value when stopped.
- 10. DIM/BRIGHT BUTTONS:** Clicking on the #8 button will decrease the display brightness, and clicking on the #9 button will increase it. Default is set to the brightest value. They are also used in entering the count-down value in the count-down screen.
- 11. TRANSPONDER CODE SET BUTTONS:** Number buttons 0-7 are used to enter the transponder code. They are also used to enter the count-down value in the count-down screen. As noted above, the CRSR BUTTON must be clicked to enter timer value.
- 12. VFR BUTTON:** Sets the active transponder frequency to the VFR frequency 1200 directly.
- 13. IDENT BUTTON:** Activates a special identification pulse (SPI) for 18 seconds to distinguish your aircraft from others on the air traffic controller's screen.. The word IDENT is visible in the upper left side of the screen during this time.
- 14. STBY BUTTON:** Stops the transponder from replying to any interrogations. Will also power up the transponder unit.

24. GTX 330 FUNCTION SCREENS



1. **PRALT SCREEN:** Displays the PRESSURE ALTITUDE in feet / 10. Information only, no user input. The ALT BUTTON must be clicked to display value. Serves as the default screen.
2. **FLT TIME SCREEN:** Displays the flight time in hr:min:sec format. The timer is automatically on when the aircraft is higher than 30 feet off the ground. It can be stopped, or started, by the START/STOP BUTTON. Clicking the CLR BUTTON will reset the value to 0.
3. **ALTMON SCREEN:** Displays the number of feet away from the set altitude. If the aircraft is higher, the word ABOVE will be shown, if lower the word BELOW will be shown. Can be turned off/on using the START/STOP BUTTON. ALT BUTTON must be clicked to show altitude information.
4. **DENALT SCREEN:** Displays the OUTSIDE AMBIENT TEMPERATURE in degrees Celsius and the DENSITY ALTITUDE in feet. The ALT BUTTON must be clicked to show altitude information.
5. **COUNT-UP SCREEN:** Typical count-up timer displayed as hr:min:sec. Start and stop using the START/STOP BUTTON. Reset using the CLR BUTTON.

- 6. COUNT-DOWN TIMER:** Typical count-down timer displayed in an hr:min:sec format. Start and stop using the START/STOP BUTTON. Reset using the CLR BUTTON. Use number buttons at the bottom of the unit to enter data. The CURSOR BUTTON must be clicked, and the timer reset before entering new count-down numbers. The value cannot be changed when the count-down is active.

INSTRUCTIONS:

1. Power on the unit using the ON, STBY, or ALT BUTTON. Turning the unit on with the ALT BUTTON will allow you to receive altitude information without having to click on the ALT BUTTON at a later time. Check to make sure the ON/OFF ANNUNCIATOR is on.

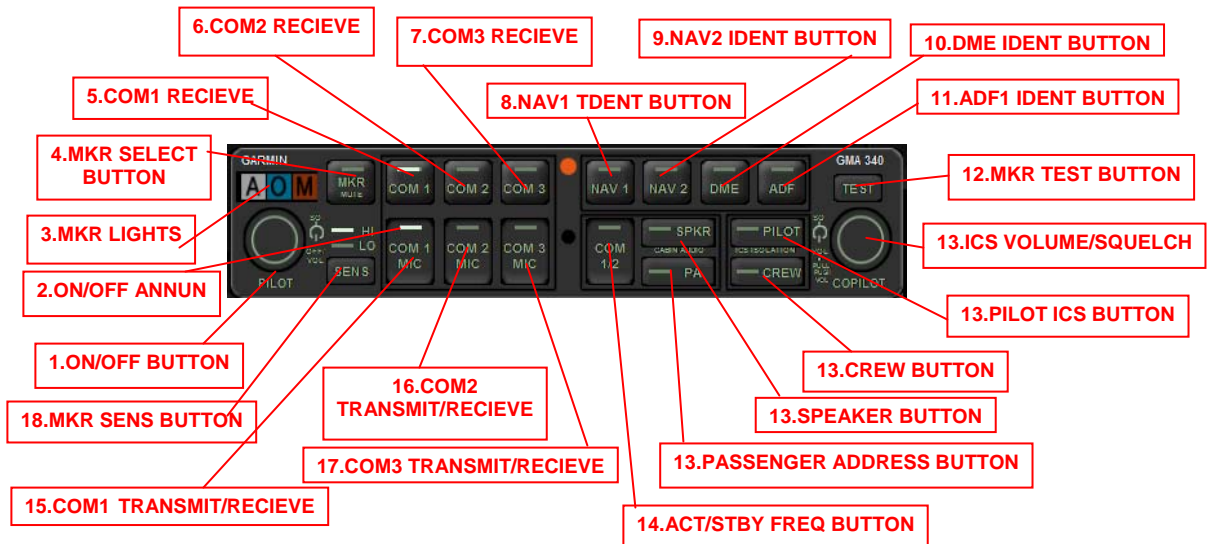
(NOTE: The following steps prior to turning the transponder off are not necessarily in a must-follow order.)

2. Use the number 8 and 9 buttons to select the desired brightness of the screen.
3. Click on the FUNC BUTTON to get to the FLIGHT TIMER screen. If desired, the timer can be reset to 0 by clicking on the CLR BUTTON, or turned off by clicking the START/STOP BUTTON. Default is on any time the aircraft is higher than 30 feet from the ground.
4. Click the FUNC BUTTON again to get to the ALTITUDE MONITOR screen. Click on the START/STOP BUTTON to turn on/off the altitude monitoring function.
5. Click the FUNC BUTTON again to get to the DENSITY ALTITUDE screen. There is no user input per se, only information is displayed, and only displayed if the altitude function is on (ALT BUTTON clicked).
6. Click the FUNC BUTTON another time to get to the COUNT-UP TIMER screen. Start/stop and/or reset the timer to 0 using the appropriate buttons.
7. Click the FUNC BUTTON again to go to the COUNT-DOWN TIMER screen. Click on the CURS BUTTON to allow for count-down data entry. A rectangle will appear behind the first digit of the timer display. Click on any of the 9 numbers to enter that number into the first digit location. This entry will cause the rectangle to be shifted to the next digit to the right and the unit will be ready for the next number. This process is repeated until all of the numbers have been entered. When the last number has been entered, the rectangle will disappear and the number will be set as the active number. Entering the last number will also set the TRANSPONDER CODE SET numbers back to changing the code rather than the timer. Count-down data entry can be cancelled at any time by clicking on the CURS BUTTON. You can also scroll in reverse order

through the timer numbers when entering data by clicking on the CLR BUTTON. The unit will not allow you to enter minutes or seconds higher than 59.

- 8.** Set the transponder code using the TRANSPONDER CODE SET BUTTONS. Click on any of the 7 number buttons to enter that number into the first digit. A rectangle will appear behind the next digit indicating the unit is ready to accept the next number. Repeat this process until the last number is entered, at which time the rectangle will disappear and the 4 digit number will be set as the active code. Data entry can be cancelled at any time by clicking on the CURS BUTTON. Clicking the CLR BUTTON when adding code values will allow scrolling in reverse order through the values. The code can be changed at any time by the above process except when entering count-down data.
- 9.** Use the VFR BUTTON to change the transponder code directly to the VFR frequency 1200.
- 10.** Click on the IDENT BUTTON if ATC asks for your ident.
- 11.** Clicking the FUNC BUTTON at the count-down screen will "wrap around" to open the default pressure altitude screen.
- 12.** Turn the transponder unit off by clicking on the OFF BUTTON.

25. GARMIN GMA 340



The Garmin GMA 340 audio panel provides a means for the user to alter various communication features. The user can toggle between 4 different com frequencies, and can listen to 2 stations at the same time if desired. In the real world, the panel is also used to define communications between pilot and co-pilot, crew, and passengers (intercom system).

The audio panel also functions to alert the pilot when a marker beacon signal has been received. There are 3 color coded marker beacon indicator lights in the upper left corner which light up according to the signal received. A blue light illuminates to indicate the outer marker, amber light to indicate the middle marker, and white light to indicate the inner marker. In addition, there is an audio alert on by default which can be toggled off without turning off the marker lights. A similar color coded alert is displayed on the PFD when these alerts are activated.

1. **ON/OFF BUTTON:** Clicking on this button turns the audio panel on and off.
2. **ON/OFF ANNUNCIATOR:** Shows if a button (function) is on or off. The bar is illuminated when the function is on.
3. **MKR LIGHTS:** Color coded marker beacon indicator lights. When illuminated they indicate reception of the corresponding marker signal. Used mainly to estimate the relative position of the aircraft to the runway in an ILS approach.



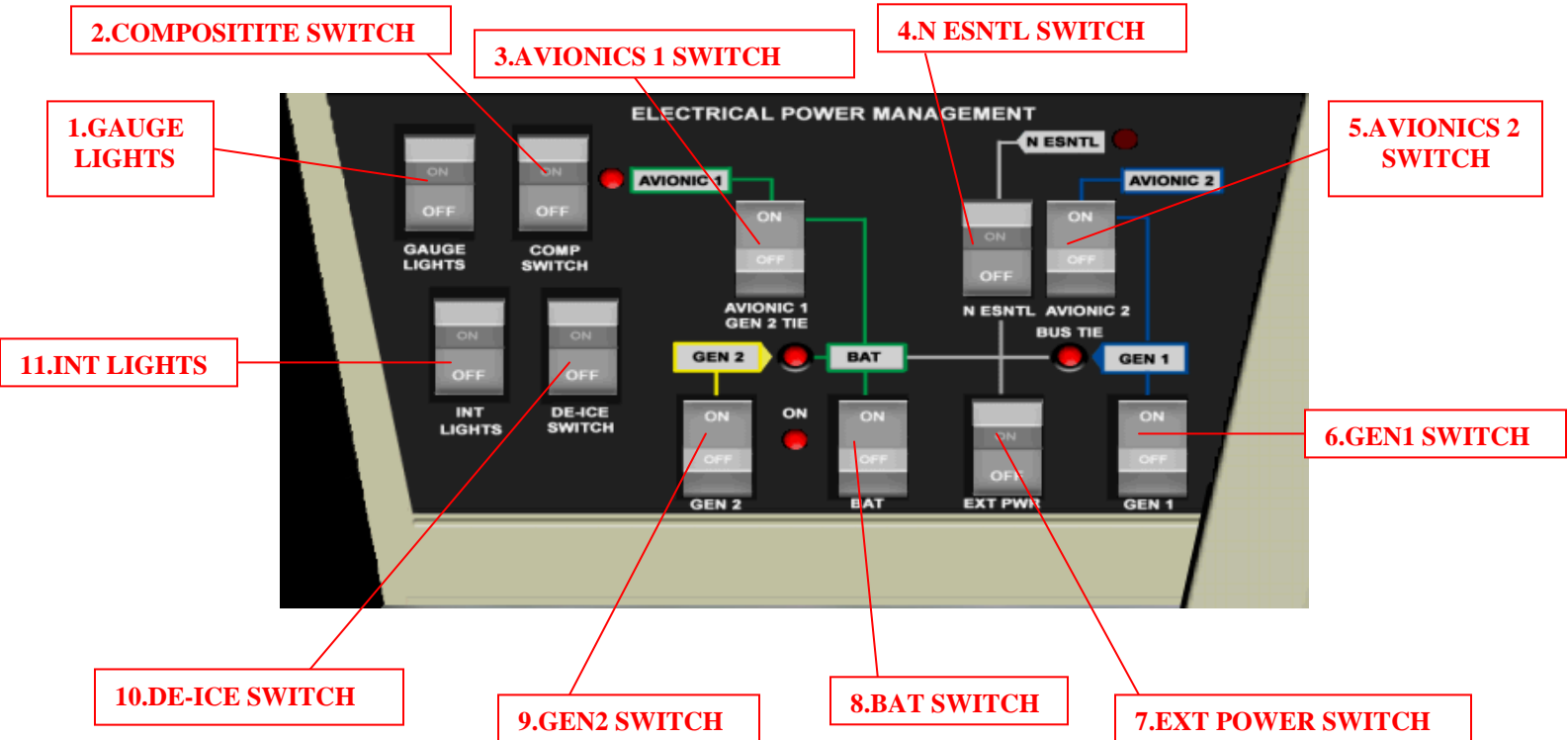
4. **MKR SELECT BUTTON:** This button has 2 functions. It is used to toggle the visual and audio marker alerting systems on and off, and is used to selectively turn off the audio alert function. The visual and audio marker alerting systems are off by default. Clicking this button once will turn both alerts on, clicking again will selectively turn off only the audio alert. Click a third time to turn both alerting systems. The on/off annunciator light will come on when the systems are turned on, and will remain on until both are off.
5. **COM1 TRANSMIT/RECEIVE:** Toggles the COM1 receive only function on and off. The bar is illuminated when COM1 receive only function is on. Not active in the current setup.
6. **COM2 TRANSMIT/RECEIVE:** Toggles the COM2 receive only function on and off. The bar is illuminated when COM2 receive only function is on. Not active in the current setup.
7. **COM3 TRANSMIT/RECEIVE:** Toggles the COM3 receive only function on and off. The bar is illuminated when COM3 receive only function is on. Not active in the current setup.
8. **NAV1 IDENT BUTTON:** Toggles Nav1 identifying Morse code.
9. **NAV2 IDENT BUTTON:** Toggles Nav2 identifying Morse code.
10. **DME1 IDENT BUTTON:** Toggles DME1 identifying Morse code.
11. **ADF1 IDENT BUTTON:** Toggles ADF1 identifying Morse code.
12. **MKR TEST BUTTON:** Marker annunciator test button. Clicking this button initiates a marker annunciator test function. All 3 marker beacons light up for 3 seconds and then go off.
13. **ICS VOLUME/SQUELCH, PILOT ICS, CREW, SPEAKER, and PASSENGER ADDRESS BUTTONS:** All of these buttons are part of the intercom system of the GMA 340, and are inactive in the current FS2004 setup.
14. **ACT/STBY FREQ BUTTON:** Toggles between Com1 and Com2 active and standby frequencies. Switches Com1 frequencies when the COM1 TRANSMIT/RECEIVE button is on, and Com2 frequencies when the COM2 TRANSMIT RECEIVE button is on. Gives the user a choice of 4 different Com frequencies that can be accessed at the click of a button.

- 15. COM1 TRANSMIT/RECEIVE:** Toggles the COM1 transmit and receive function on and off. The bar is illuminated when COM1 is transmitting or receiving as the active frequency.
- 16. COM2 TRANSMIT/RECEIVE:** Toggles the COM2 transmit and receive function on and off. The bar is illuminated when COM2 is transmitting or receiving as the active frequency.
- 17. COM3 TRANSMIT/RECEIVE:** Clicking on this button toggles the "receive all" function on and off. When this function is on, both Com1 and Com2 signals are audible. The annunciator bar is illuminated when this function is on. Can be used, as an example, to listen to ATIS and monitor traffic at the same time.
- 18. MKR SENS BUTTON:** Selects between high and low sensitivity to the marker beacon signal. This is usually set to low when enroute, and set to high for approach and landing.

INSTRUCTIONS:

1. Turn panel on by clicking the ON/OFF BUTTON.
2. Set Com1 and Com2 active and standby frequencies on the Com1 and Com2 radios, respectively, as desired. Also a good time to set the ADF1 radio.
3. Click on the COM1 or COM2 TRANSMIT/RECEIVE button to select the desired frequency. Click on the COM3 TRANSMIT/RECEIVE button to select both at the same time.
4. Test marker beacon alert functioning by clicking on the MKR TEST BUTTON.
5. Click once on the MKR SELECT BUTTON to turn on audio and visual marker beacon alerts. Click again to turn off the audio alert.
6. Click on the ACT/STBY FREQ BUTTON to toggle between active and standby frequencies.
7. Use the COM1, COM2, DME, and ADF IDENT buttons to identify the corresponding stations by their Morse code signature.
8. Turn panel off by clicking the ON/OFF BUTTON.

26. OVERHEAD PANEL



The overhead panel contains a number of electronic switches involved in ELECTRICAL POWER MANAGEMENT. This includes switches for external power, battery, generators, avionics, and to manual turn off the N ESNTL buses. Switches for gauge-background and interior lights, for de-icing, and for toggling the PFD composite mode on and off are also located on this panel. Red illuminated lights indicate when the particular components are turned on. The overhead panel in this aircraft is presented as a popup that is displayed by clicking on the overhead icon button on the ICONS BAR.

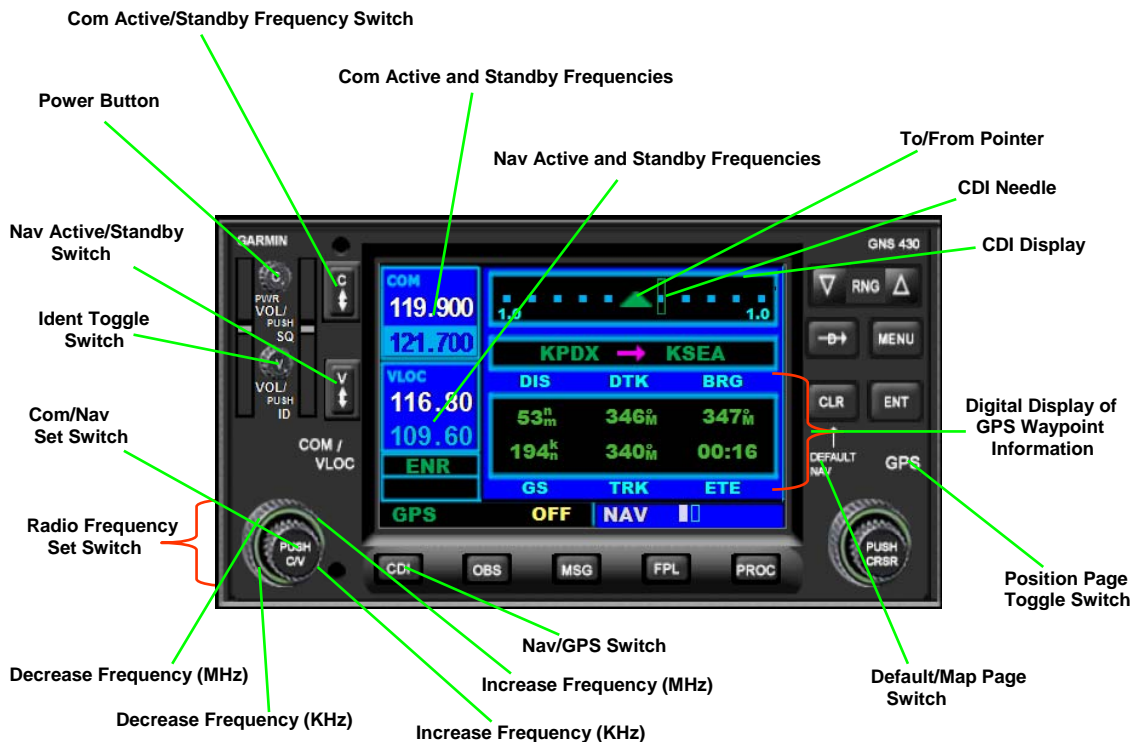
1. **GAUGE LIGHTS:** Toggles background lighting of the individual gauges on and off. It is off by default.
2. **COMPOSITE SWITCH:** Used to toggle the PFD composite mode on and off. It is off by default.
3. **AVIONICS 1 SWITCH:** Toggles the avionics 1 bus tie on and off. On by default.

4. **N ESNTL SWITCH:** Toggles the N ESNTL system on and off. Off by default which is also the auto setting.
5. **AVIONICS 2 SWITCH:** Toggles the avionics 2 bus tie on and off. On by default.
6. **GEN 1 SWITCH:** Toggles the generator 1 bus power on and off. On by default.
7. **EXT POWER SWITCH:** Switch for changing from the battery to an external power supply. Off by default.
8. **BAT SWITCH:** Switches the battery power on and off. On by default.
9. **GEN 2 SWITCH:** Toggles the generator 2 bus power on and off. On by default.
10. **DE-ICE SWITCH:** Turns the de-icing system on and off. Off by default.
11. **INT LIGHTS:** Toggles the overhead interior lights on and off. Off by default.

INSTRUCTIONS:

1. Click anywhere on the switches to toggle them on and off as desired. The top part of the switch will be "in" and the word ON will be fully shown when the switch is on. When off, the bottom of the button will be "in" and the word OFF will be fully shown.

27. GARMIN GNS430 Default Map Page



1. The power button turns the unit on and off.
2. The top number in each radio box corresponds to the active frequency, the bottom number corresponds to the standby frequency.
3. The active/standby switches toggle the active frequency to standby and the standby frequency to active.
4. The radio frequency set switch is used to tune the radios. The click areas are shown in the figure above.
5. The Com/Nav set toggle switch is used to toggle between tuning the Com and Nav radios.
6. The CDI switch (Nav/GPS switch) toggles between GPS and Nav1 navigation modes.
7. The map page bar switch displays a moving map and various flight information in a boxed rectangle along the right side of the screen. See the accompanying file “430 Nav Map Page”.
8. Clicking on the GPS icon will bring up the position page which contains information boxes displaying information relating to the position of the aircraft and its relative position to the next waypoint. A clock displays local or Greenwich mean time. See the “430 Nav Pos Page” below.

9. The digital display of GPS waypoint information shows values only for GPS waypoints (excluding TRK and GS). If no waypoint is set in the GPS, the readout will display ----.

The values will be displayed whether in the Nav1 or GPS navigation mode.

The CDI at the top of the page shows course deviation information in either Nav1 or GPS navigation modes. In the Nav1 mode, the CDI works exactly like the standard CDI display found on most aircraft. The deflection distance of the CDI needle corresponds to ~1 mile on each side of the desired track in the Nav1 mode. It corresponds to a 5 mile distance on each side when tracking a waypoint in the GPS mode.

10. All other buttons and their functions are the same as in the FS2004 default GPS500 unit and are described in the help section of the simulator. Please refer to this section for information on the functions.

11. Com/Nav standby frequencies are highlighted in cyan when setting frequency.

27a. GARMIN GNS430 NAV Map Page

Digital Display of GPS
Waypoint Information



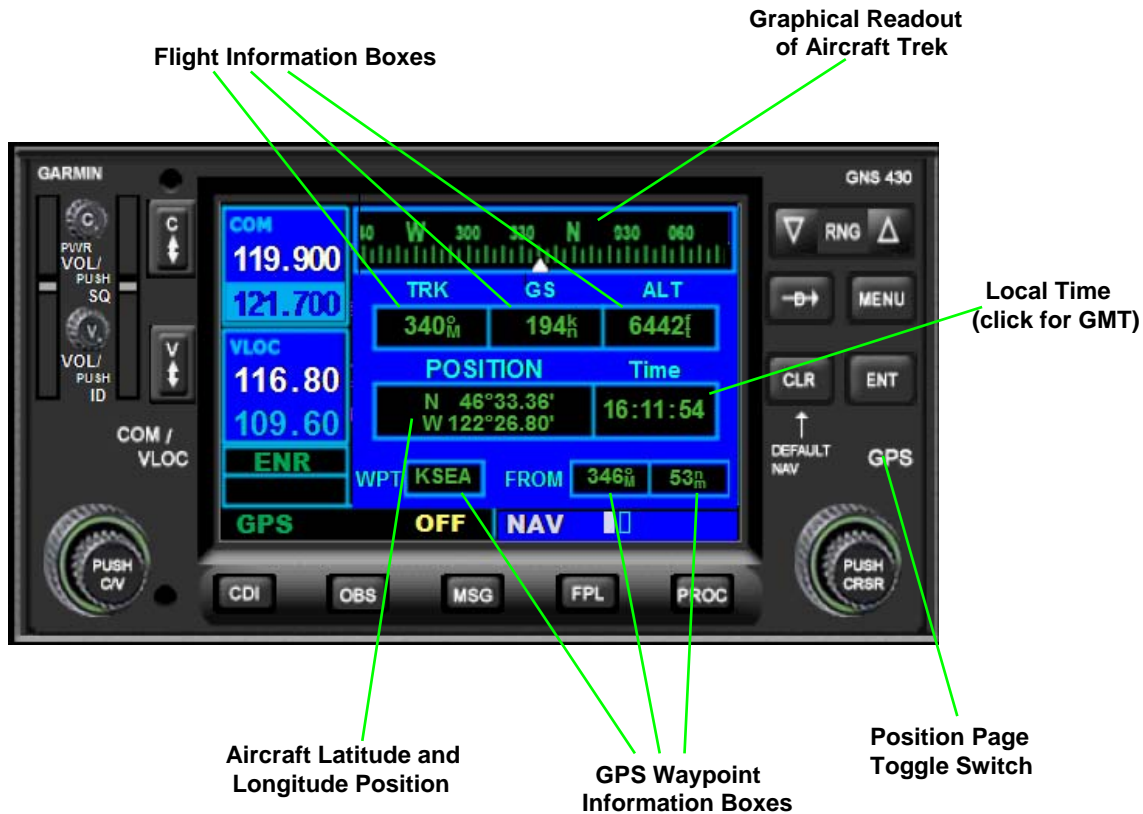
GPS Waypoint
Information Bar

Toggle Between Default
and Map Pages

1. Clicking on the “DEFAULT NAV” logo toggles the Map page on or off.
2. The information bar lists the aircraft ground speed, and the distance and direction (magnetic) of the GPS waypoint identified in the WPT box.

3. The Nav bar is only available on the map pages.
4. The Map page is only available from the default Nav page. It is not available directly from the position page.

27b. GARMIN GNS430 Position Page



1. Flight information boxes contain information relating to the aircraft position in the real world.
2. Trek graphical readout is self-explanatory. Shows the same information given in the TRK box as a sliding scale representation.
3. The position box lists the latitude and longitude of the aircraft.
4. Local or mean time listed, default is local time.
5. The waypoint boxes contain information relating to the aircraft position relative to the next GPS waypoint identified.

6. The position page is toggled on or off by clicking on the GPS logo as shown.
7. The position page can be toggled directly from the default Nav or Map pages
8. The default Nav and Map pages cannot be toggled on directly from the position page.
You must exit the position page before toggling between these 2 pages (re-click on GPS).

28. GARMIN GNS530 Default Nav Page



1. The power button turns the unit on and off.
2. The top number in each radio box correspond to the active frequency, the bottom number correspond to the standby frequency.
3. The active/standby switch toggles the active frequency to standby and the standby frequency to active.
4. Nav1 ident readout is the 3 letter code of the Nav1 beacon tuned in on the Nav1 frequency.
5. Click on VLOC knob to ident. ID appears in the upper right corner.
6. Nav1 radial is the radial degrees from the Nav1 beacon. Convert to “direct to” by adding or subtracting 180.
7. Nav1 distance is the distance from the Nav1 beacon.
8. The radio frequency set switch is used to tune the radios. The click areas are shown in the figure above.
9. The Com1/Nav1 set toggle switch is used to toggle between tuning the Com and Nav radios.
10. The CDI switch (Nav/GPS switch) toggles between GPS and Nav1 navigation modes.

11. The Nav bar switch displays flight information in a boxed rectangle along the right side of the screen. The bar can be displayed in the default or map pages. See the accompanying “530 Nav Bar Page”.
12. The CDI displays course deviation information in either Nav1 or GPS navigation modes. In the Nav1 mode, the CDI works exactly like the standard CDI display found on most aircraft. The deflection distance of the CDI needle corresponds to ~1 mile on each side of the desired track in the Nav1 mode. It corresponds to a ~5 mile distance on each side when tracking a waypoint in the GPS mode.
13. All other buttons and their functions are the same as in the FS2004 default GPS500 unit and are described in the help section of the simulator. Please refer to this section for information on the functions.
14. Com/Nav standby frequencies are highlighted in cyan when setting frequency.

28a. GARMIN GNS530 Nav Map Page

Digital Display of GPS
Waypoint Information



1. Mostly self-explanatory.
2. A bar on the right side displays specific information about the aircraft and its geographical relative to the waypoint listed in the WPT box.
3. The bar is toggled on and off by clicking on the “DEFAULT NAV” logo.