



F-117A Nighthawk Panel and Gauges for

Contents

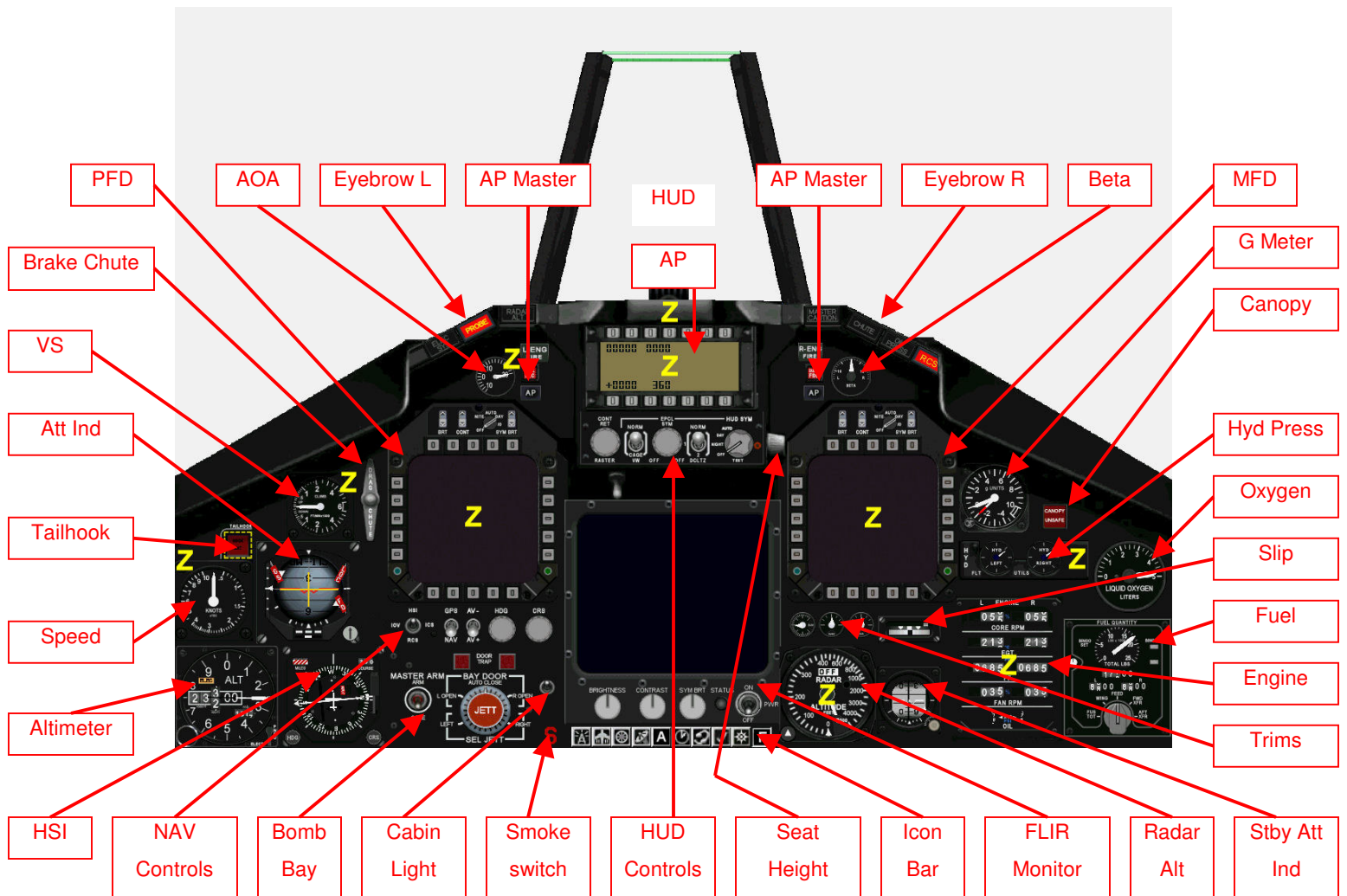
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General Details

These instructions assume that the pilot has a good working knowledge of aircraft and navigational systems. All the gauges have tool tips for additional information and tips. The gauges were written in XML coding.

Gauge Position and Zoom Functions

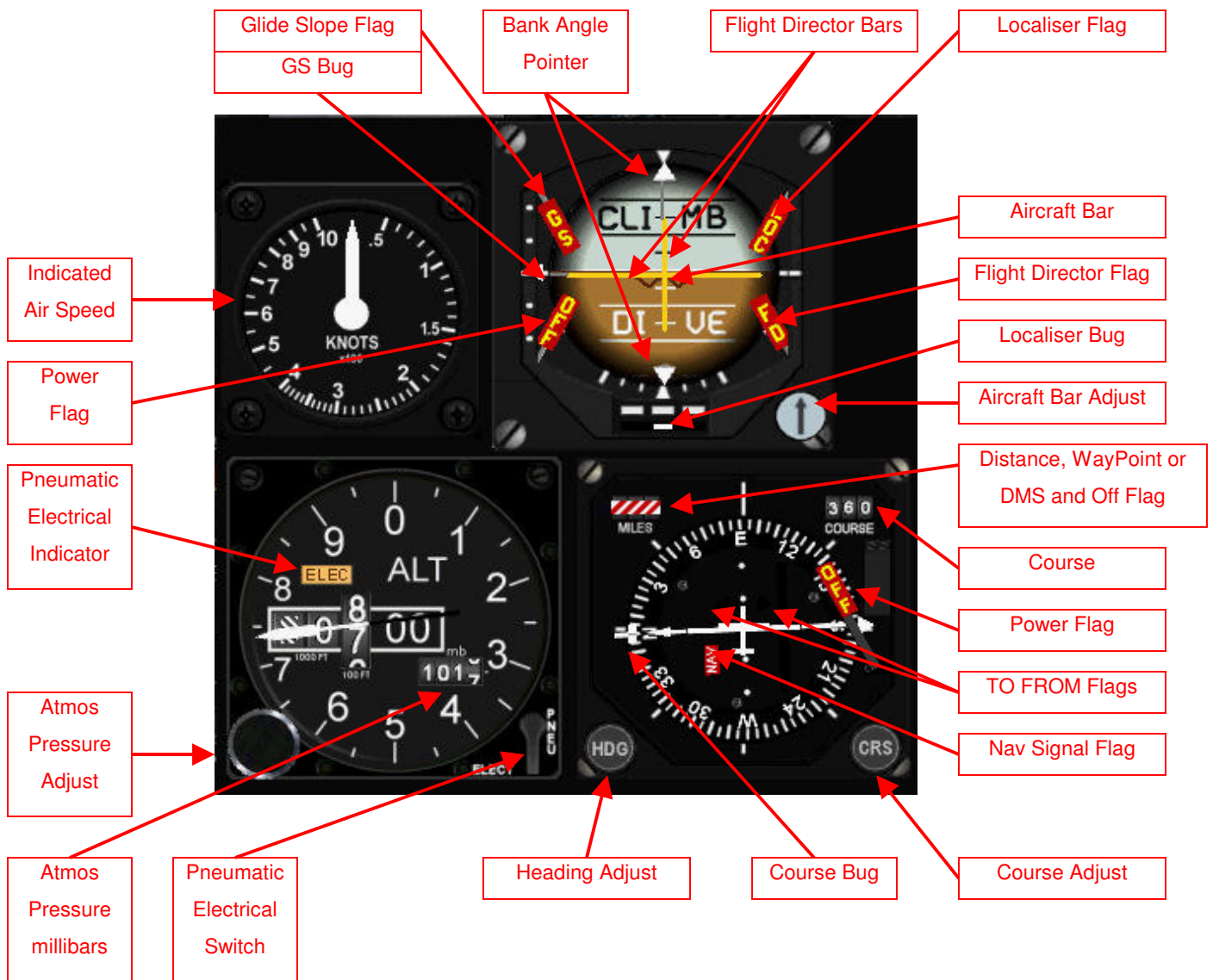
Zoom function. There are various mouse click locations on the panel where individual gauges or groups of gauges can be zoomed to make them larger. Tool tips appear to show the correct positions. Clicking the same position on the zoomed gauges or the original panel area will close the enlarged view. The top 'Z' position zooms the HUD, but is only active when the HUD is switched on (See the HUD section for further details).



The icon set bottom middle opens additional windows.
The gauges work the same way in both the 2D Cockpit and 3D Virtual Cockpit views. They can be mouse controlled in both views.

The gauges are realistically illuminated at night, with each gauge having its own internal lighting in VC view. Some of the gauge text does not match the function. This is done for graphical realism, especially if FS2004 does not support the function.

Air Speed, Attitude Indicator, Altimeter and HIS



- 1) ASI. Shows the indicated air speed in knots.
- 2) Attitude Indicator. The 'ball' shows the bank and pitch attitudes. The four flags show individually if there is no ILS signal (GS and LOC), flight director is off (FD) and if power is interrupted (OFF, avionics or battery). The left hand needle indicates glide slope alignment and the bottom white rectangle indicates localizer alignment when the radio NAV1 is set to the ILS frequency. The top and bottom white triangular pointers are banking indicators. The knob will raise or lower the aircraft bar. Proper setting is with the valleys of the 'W' on the centre line when on runway.
- 3) Altimeter. This gauge shows the pressure altitude in thousands of feet. The smaller rolling numbers indicate atmospheric pressure in mb. The large knob changes the pressure setting. The small lever changes between electrical or pneumatic for realism but has no function in FS2004.
- 4) Horizontal Situation Indicator. The HDG knob changes the heading bug. The CRS changes the course needle. The miles window is the distance to the next beacon, DME or waypoint according to GPS setting. A flag covers this value when there is no nav signal. The 'nav' flag that rotates with the instrument disk indicates a lack of navigational signal. Additionally, there are 'TO' and 'FROM' triangular white indicators on the same disk. An OFF flag shows with an interruption of power.

Vertical Speed Indicator



This gauge shows climb or descent rate in feet per minute.

Tail hook Indicator and Button



The button is pushed to operate the tail hook that is animated on the visual model.

Chute Brake Handle



The chute handle operates the braking parachute and is mainly used to set automatic deployment on landing, when the nose wheel contacts the runway. It can also be used for an abortive takeoff, but only when exceeding speeds of 80 knots.

The handle has three positions.

The first position is the default off condition (OFF, ZERO DRAG).

The first click sets the next position (POSITION 1) and makes the handle look larger simulating that it has been pulled (safety feature).

The second click sets the next position (AUTO SET) and rotates the handle 90° which activates the chute when the nose wheel is rolling, either on landing or above the activation speed on takeoff. After the chute has been deployed and released onto the runway, the handle automatically resets to the off position, and the chute is ready for future use. **To ensure there is no drag on the aircraft, the handle must be in the default OFF position.**

The right hand eyebrow warning light cluster contains a chute lamp indicating the chute situation. When the handle is in the auto position, a green light indicates that the auto deployment is activated. A red light indicates that the chute has been deployed and blue when released. The light extinguishes when the chute cycle is complete and reset.

The chute in the model provides drag to slow the aircraft. It is also fully animated in the external visual model. The chute can be seen to deploy and release. It is not visible (for realism) when returning to the fuselage locker to be stowed.

Angle of Attack and Beta Gauges



The AOA gauge shows the nose attitude in degrees. The Beta gauge shows the horizontal angle of attack in degrees. If other than 0, the nose veers from course. Also used for turn coordination instead of the slip indicator.

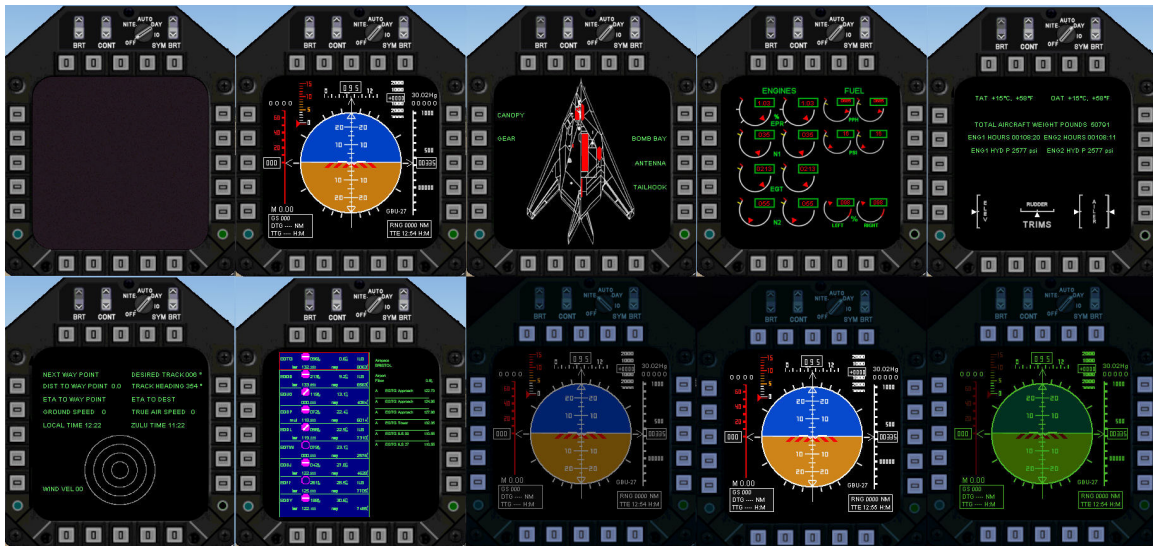
Primary Flight Display



The top switches/ knob have the following functions.

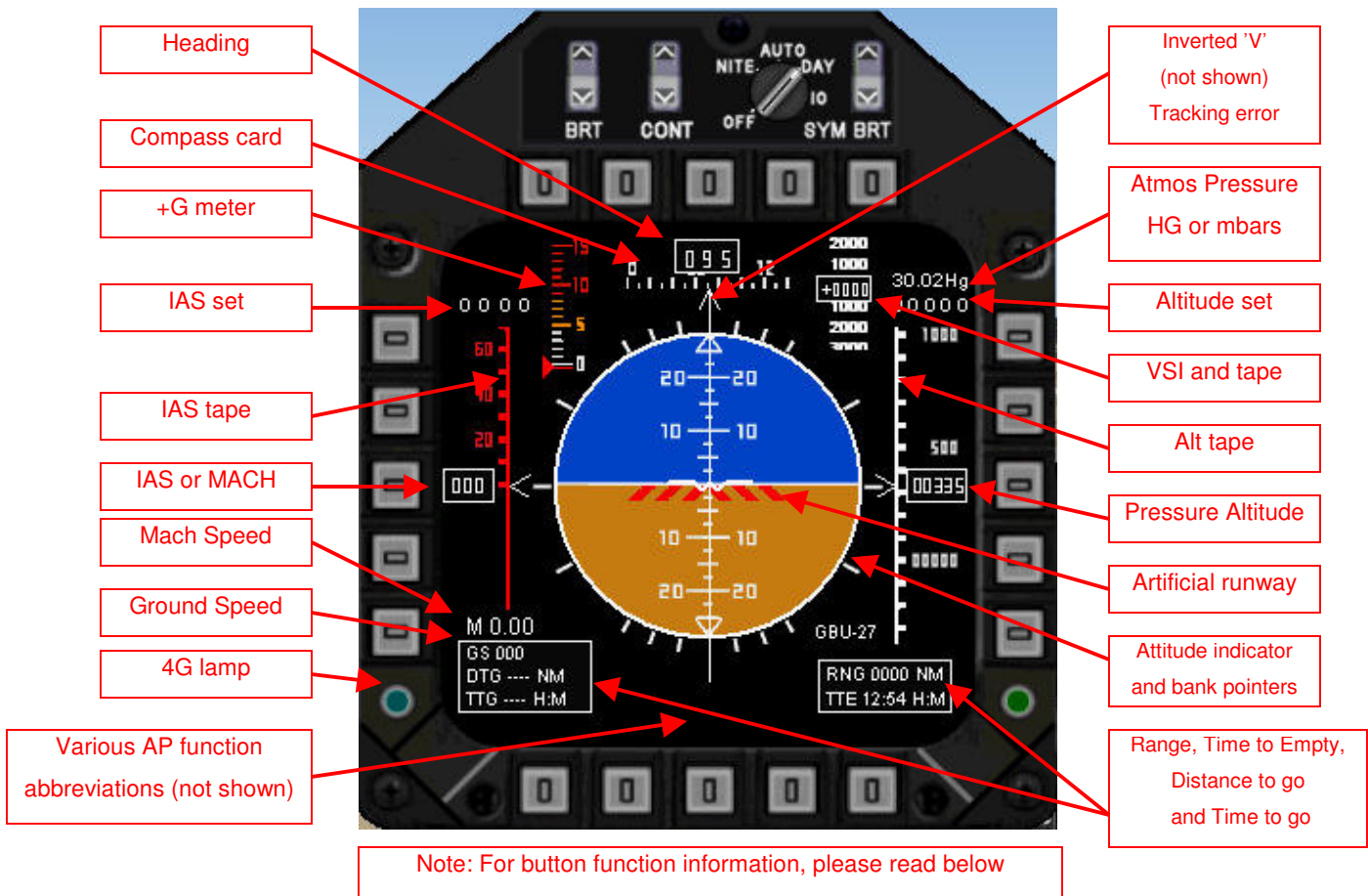
BRT Switches between bright and luminous at night in 2D view.
CONT switch, no function, but animates for realism.
Knob. OFF (obvious), NITE, dimmer view, AUTO, bright view, DAY and IO, no function.
SYM BRT switch, no function, but animates for realism.

The lower left blue light illuminates if the G force exceeds 4G. For technical reasons, running either the PFD or MFD in night mode tends to reduce frame rates. This is not so in the case of the HUD.



These general views show the dimming and luminous functions, as well as the pages available. See below for more page details and the button functions. Note: The button order is based on order of importance.

Button 20



Button 20 returns to the above default page.

Button 19



This page shows any part of the aircraft that can show up on enemy radar, namely canopy open, gear down, the refuel doors, bomb bay open and antenna raised when the radio is turned on. When such a condition exists, a lamp marked RCS (Radar Cross Section) illuminates on the right eyebrow lamp cluster.

Button 18 This page shows engine and fuel information.

Button 17 This page shows TAT and OAT temperatures, aircraft weight, engine hours, hydraulic pressure and flight control trims.

Button 16

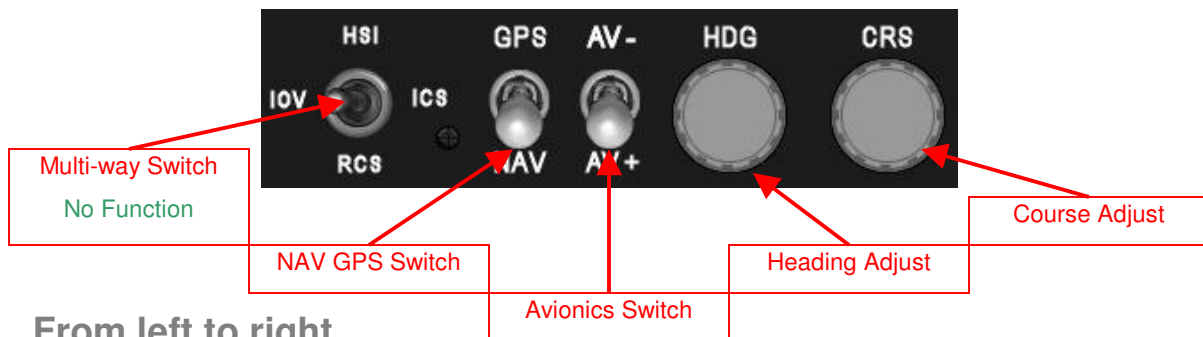


This page shows waypoint information, speeds and times. The wind gauge shows velocity and a vectored pointer that gives relative direction between the wind direction and the aircraft direction. The pointer length changes to show velocity magnitude.

Button 1 Toggles flight director.
 Button 2 Zeroes the PFD G meter.
 Buttons 3 and 4 No functions.
 Button 5 Toggles the atmospheric pressure units between millibars and HG (inches of Mercury).
 Button 6 and 7 Raises and lowers the 'W' aircraft bar.
 Button 8 Toggles the attitude gyro cage in the PFD and the three other attitude indicators (including the HUD).
 Buttons 11 and 12 No functions
 Button 15 Opens page showing 9 nearest airports list
 Buttons 13 and 14 Scrolls up or down the airport list
 Buttons 9 and 10 Scrolls the frequency list

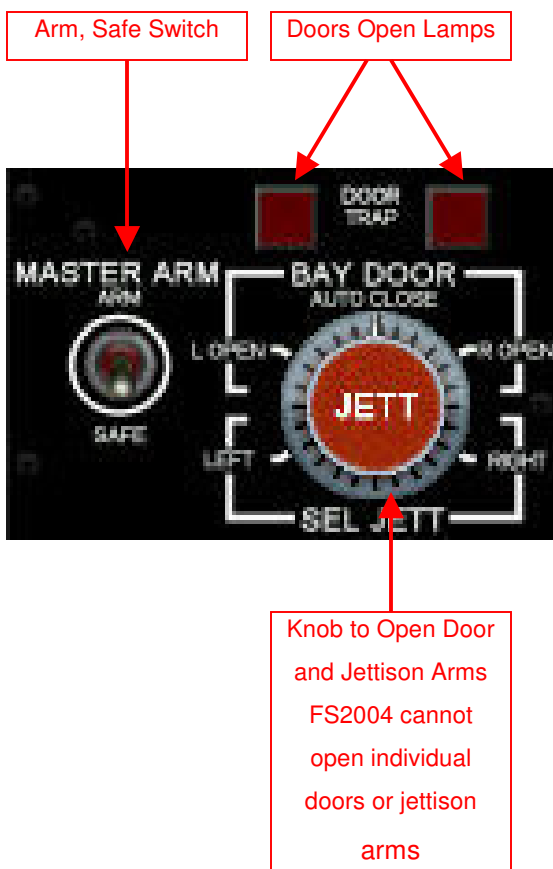
An inverted 'V' shows under the heading compass card, moving horizontally, when flying a flight plan. It shows the tracking error. The numerical equivalent is shown in the top left corner on the HUD.

Control knobs and switches under the PFD



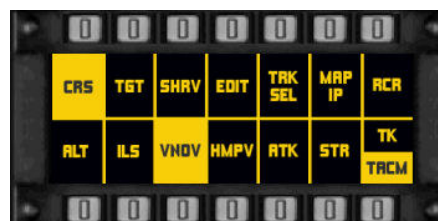
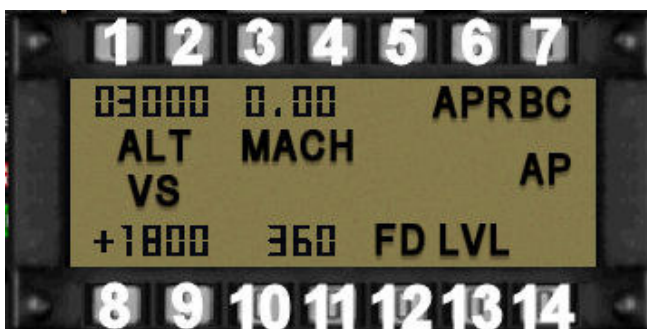
From left to right,
 Multiway switch, no function.
 2 way switch, switches between GPS and NAV navigation.
 2 way switch, switches avionics circuits on or off.
 HDG Knob sets heading.
 CRS Knob sets course.
 Note. A switch to the left of this panel operates the cockpit VC light, that is, a general illumination of the cockpit space and not the night gauge illumination (which will be dealt with later). The light only operates in the virtual cockpit view.

Bomb Bay Door Operation



To activate operation, the master arm switch must be switched to the 'ARM' position. The 'JETT' knob can then be moved by clicking on any of the text surrounding the knob. Any text position operates both bomb doors. FS2004 does not distinguish between left and right for this function. The knob will rotate and point to any text position for realism. The two red lights illuminate when the doors are open. To close the doors, click on the 'AUTO CLOSE'. Deactivate the 'JETT' knob with the 'MASTER ARM' switch.

Automatic Pilot



centre. The smaller picture shows the authentic view by clicking on the top right screw head.

1 Toggles altitude hold
3 Toggles speed hold.

2 Left or Right click Altitude.
4 Toggles MACH hold.

- | | |
|---------------------------------|---------------------------|
| 5 Left or Right click Speed. | 6 Toggles APR hold. |
| 7 Toggles Back Course hold. | 8 Left or Right click VS. |
| 9 Toggles heading hold. | 10 Toggles NAV hold. |
| 11 Left or Right click Heading. | 12 Toggle Flight Director |
| 13 Toggles wing leveller. | 14 Spatial Disorientation |

Buttons 2, 5, 8 and 11 can be clicked with the LEFT or RIGHT mouse button. LEFT increases and RIGHT decreases the associated value.

The four numeric values are altitude, speed or mach, vertical speed and heading. These can also be set by clicking on the left or right areas of each numeric value and tool tips help with their identification, values and units.

Spatial Disorientation, Button 14

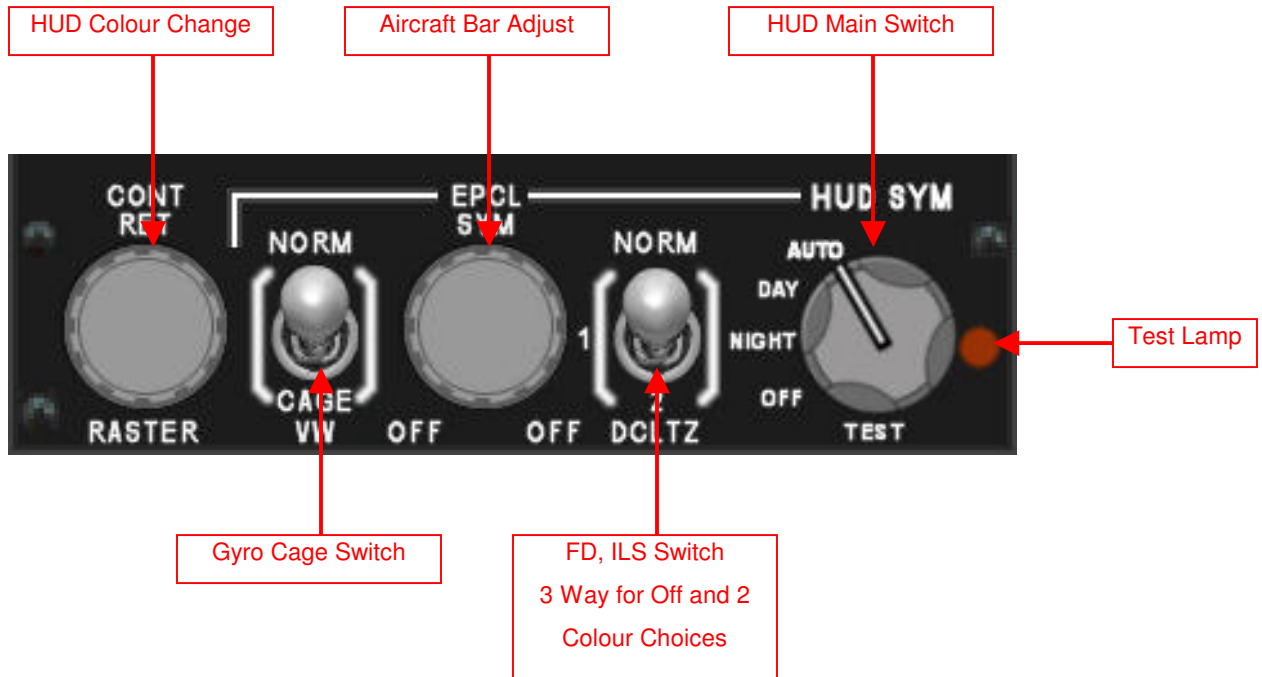
The real aircraft has a Spatial Disorientation system. It is unfortunate that pilots can 'lose their bearings' in certain circumstances and has been the cause of numerous fatalities. This can be a complex subject and several web sites cover this phenomenon comprehensively. In this model, when the system is activated, the ailerons are operated to level the wings to within a bank angle of 5° and then the wing leveller is activated. The radio altitude is locked into the AP at the time of activation and gives the AP an altitude to fly to. If this altitude is less than 3000 feet, then 3000 feet is set on the AP. The throttles also go to maximum. Therefore, the aircraft is levelled, has an altitude to head for, attempts to minimise stall conditions and allows for low altitude. This button is therefore an automatic system to get the aircraft back into a safe flyable situation. There are situations where this will not help, if too low for example. If altitude is sufficient, the aircraft can be inverted and stalling, but the SD system will still correct this situation.

NOTE: Yaw damper has been omitted from this aircraft.



The auto pilot is activated by clicking on one of the two AP buttons positioned above the PFD and MFD. When AP is active, the buttons illuminate.

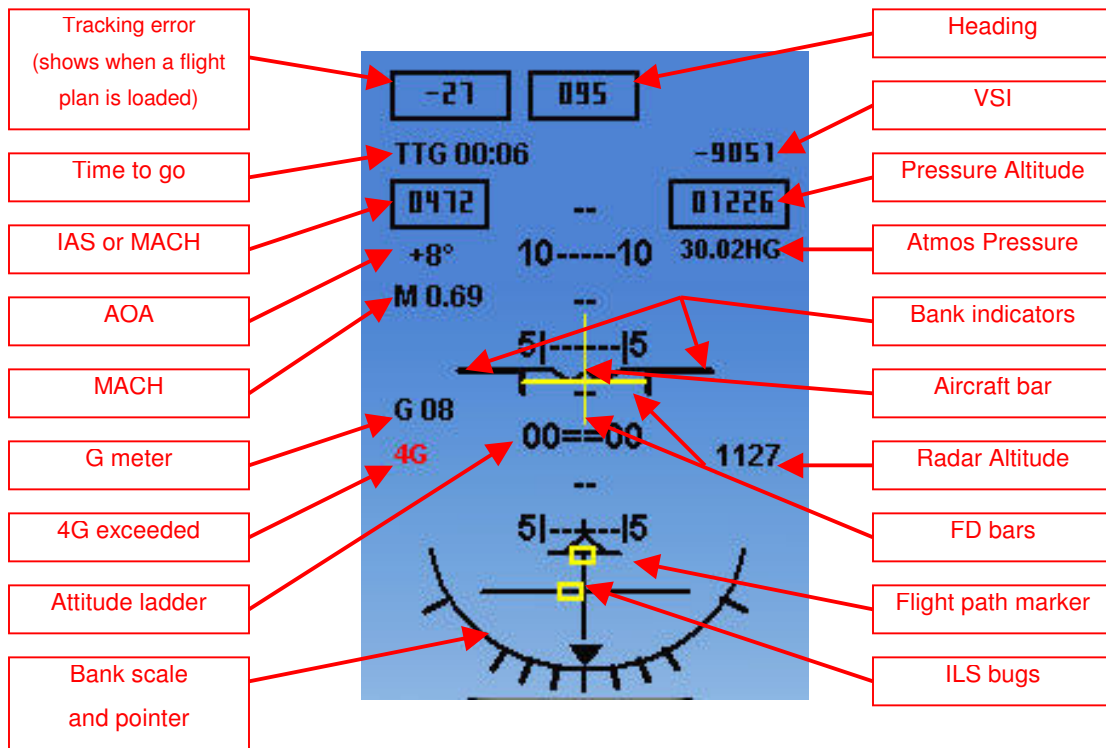
HUD Controls



Under the auto pilot is the HUD control panel.
From left to right, the control functions are,
HUD colour for personal choice and to aid day or night viewing.
Attitude gyro cage.
Aircraft bar raised or lowered.
Three position switch:
Up. FD and ILS information on the HUD is switched off.
Middle. FD and ILS information on the HUD is switched on and coloured magenta.
Bottom. FD and ILS information on the HUD is switched on and coloured yellow.
The final knob if clicked anticlockwise to 'TEST' illuminates the test light. Click clockwise to turn on to 'NIGHT' for darker colours and 'DAY' or 'AUTO' for the bright view.

HUD

The HUD shows within the HUD frame. A larger view is obtained when zoomed. Turn the HUD on first to activate the zoom area then click on the zoom area between the auto pilot and the HUD. The enlarged HUD appears without the HUD frame.



The information colour can be set to green, red or white. The night colours are darker versions of the bright colours. The panel light illuminates all gauging and this includes the HUD which has its own built-in illumination, making it bright and easy to see at night. The background remains transparent. The projector lens systems also illuminates when the HUD is on. The symbol slightly obscured by an ILS bug is the Flight Path Marker. This symbol moves around the HUD according to the aircraft's attitude to show where the aircraft will go. In other words, the flight path marker is where the aircraft is going, regardless of where it is pointed. If the flight path marker is superimposed on terrain or an obstruction, the aircraft's current path through the air will result in a collision with that object. The attitude ladder only moves in the vertical axis. The L shaped lines, shown in line with the W shaped aircraft bar, represent the aircraft banking angle and rotate about the gauge's centre. If G is greater than 4G, the red '4G' text appears. The radar altitude appears if the radar height is below 5000 feet. The Time to Go is the time to the next waypoint. If the radio is tuned to ILS, the LOC and GS bugs appear.

Target Monitor



Bright, Dim Knob

Zoom Knob

View Select Knob

On / Off Lamp and Switch

Turn on with the right hand switch. The green opening screen is a copy from the real aircraft but cannot be functional in FS2004. However, some active information is available on the dark green bands. Click the right hand knob to open the forward 'camera' view in 2D view. Click the centre knob to zoom in or out. Click the right hand knob again, and each click produces target views. These target views can be dimmed at night using the left hand knob, but not the windowed view. Note: The 'camera' view is not available in VC view. Instead the FLIR view appears. The horizon rotates with bank angle and moves vertically with pitch angle. Except for the 'camera' view, the other views are green with the panel lights on.

Multiple Flight Display



The MFD basically displays the EXP/ FULL view (see next picture below) and navigation data pages (read below).

The top knob and switches operate the same way as the PFD, except the right hand switch produces more nav data (read below).

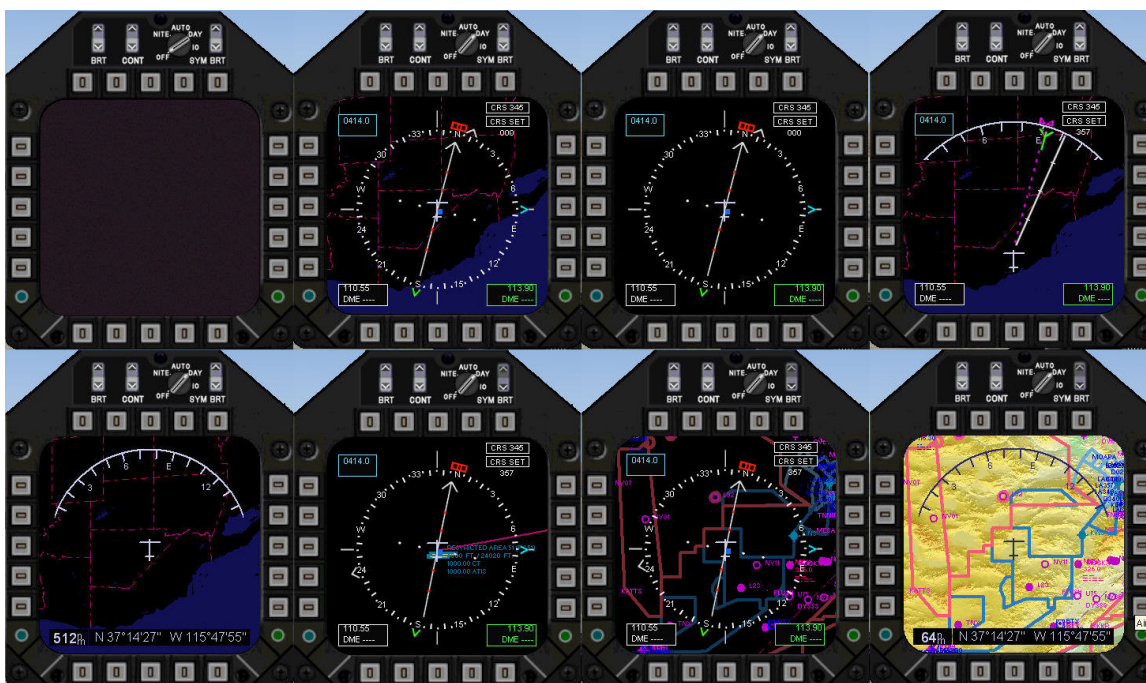
When on, the default view is the map page with the FULL overlay. The multiple pictures below show typical

views. Not all pages are shown.

Buttons 1, 2 and 3 select FULL (or EXP) view only, pages plus FULL (or EXP) and pages only.

Default view
FULL + MAP

EXP + MAP



Buttons 4 and 5 decreases or increases the course setting.

Button 6 toggles the FULL and EXP view.

Buttons 7 and 8 will zoom the pages in or out.

Button 9 toggles the terrain view if the map page is active.
Button 10 toggles the aircraft symbol that shows in the gauge centre.

It's now best to look at buttons 20 down to 11. These turn on (and off) individual navigation information pages. Button 11 clears all pages.

Buttons,

20 Airport Locations

19 VORs (VHF Omni directional Range)

18 NDBs (Non Directional Beacon)

17 Airport approaches

16 Active flight plan (if one is loaded in FS2004)

15 Intersections

14 Nearest airspace

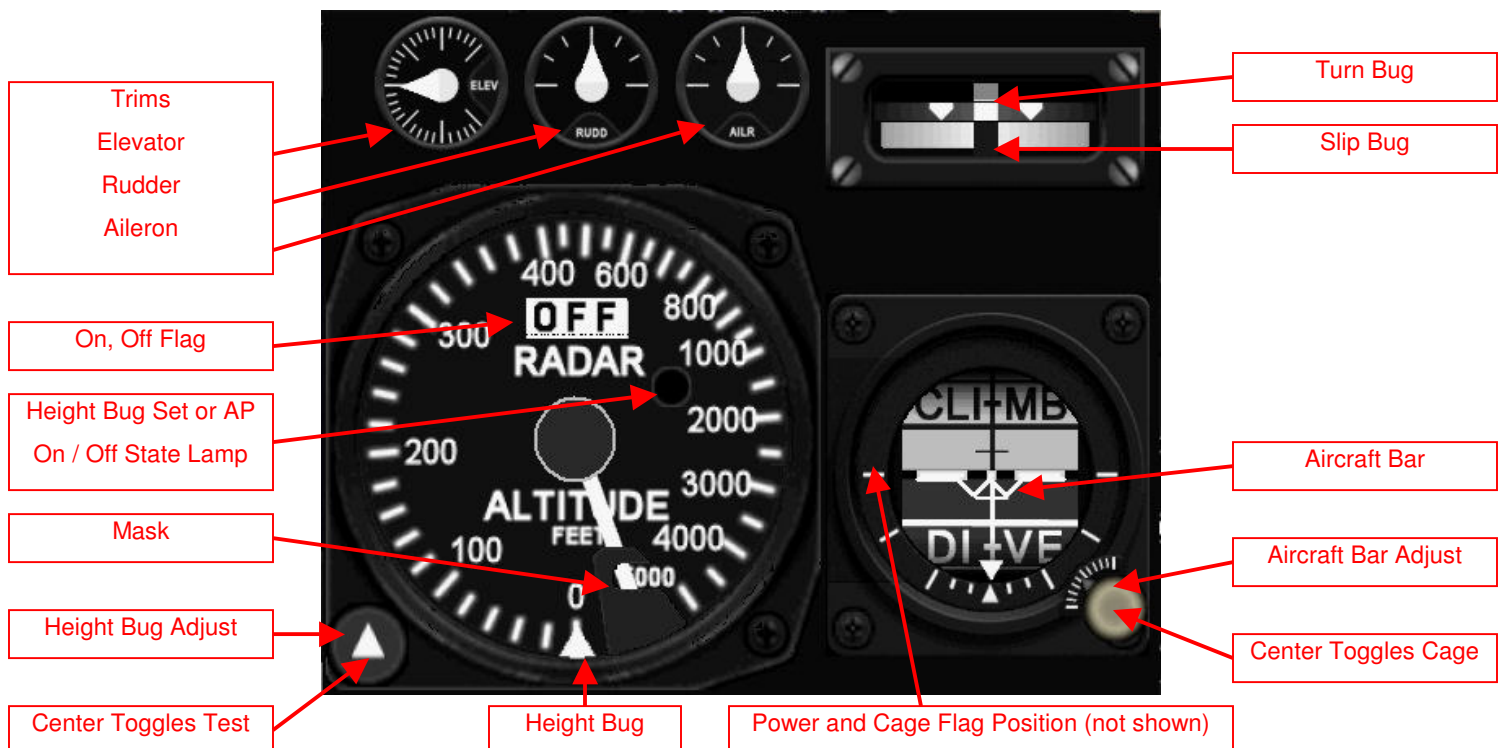
13 Map

12 Borders

11 Clears all pages as stated above.

More navigational information is shown with the (BRT) rocker switch. If wind speed is above zero, the speed and direction are shown at the bottom of the gauge along with the wind needle.

Radar Alt, Trims, Compass and Stby Att Ind Gauges



Radar gauge

The radar gauge shows the radio height between the aircraft and ground so is dependant on the grounds topography. It operates between radar heights of zero to 5000 feet. When at zero feet or above 5000 feet, the gauge is automatically switched off and the 'OFF' flag shows. When off the needle hides behind the mask.

The knob centre toggles the test condition and the needle should move and be fixed at 100 feet. The right and left side of the knob will raise or lower the triangular bug. This can be set between zero and 400 feet and the lamp will illuminate green. If set to, say, 300 feet, when the aircraft height falls below 300, the radar warning light on the left eyebrow light cluster will illuminate.

Also, this gauge can be used to automatically turn off the auto pilot. Set the height as above. Tune the radio to the ILS frequency. Below 300 feet, the AP will turn off and the green lamp will change to red.

Trims

The three small gauges are used to adjust and display trims. From the left they are elevator, rudder and aileron. Click top/ bottom (elevator) or left/ right to vary the trim.

Slip and Turn

The top bug is turn coordinator and the bottom bug is slip. Tooltips show the values and units.

Back-up attitude indicator

The ladder is on a cylinder instead of a ball like the main attitude indicator. The cylinder rolls and rotates to display the aircraft attitude to the horizon. Clicking the centre of the knob cages the cylinder and the off flag appears (not shown). This also appears when the power is off. The left and right areas of the knob lower or raise the aircraft bar.

G Meter, Oxygen and Hydraulic Pressure Gauges



Push to Reset Pointers

The G meter has two red pointers that move with the needle to show the max and min values attained, and remain in these positions until the knob is clicked to reset them to zero. The maximum recommended value is 4G. The needles are shown in the above picture registering positive and negative G value attained. When reset, they lie beneath the main needle.

The Liquid Oxygen gauge (for pilot respiration) starts a 12 hour countdown when the aircraft is loaded and the needle moves to show remaining amounts. The time can be reset to 12 hours by clicking on the gauge's face. I cannot explain why there is 12 hours of Oxygen and the gauge face has a max numerical value of 5. However, a tool tip shows the time remaining. Incidentally,

the green Oxygen bottle on the ejector seat is for ejection purposes only.

The Hydraulic gauges display hydraulic pressure with the actual values in tool tips. The left is for flight control surfaces and the right is for utilities and auxiliary circuits.

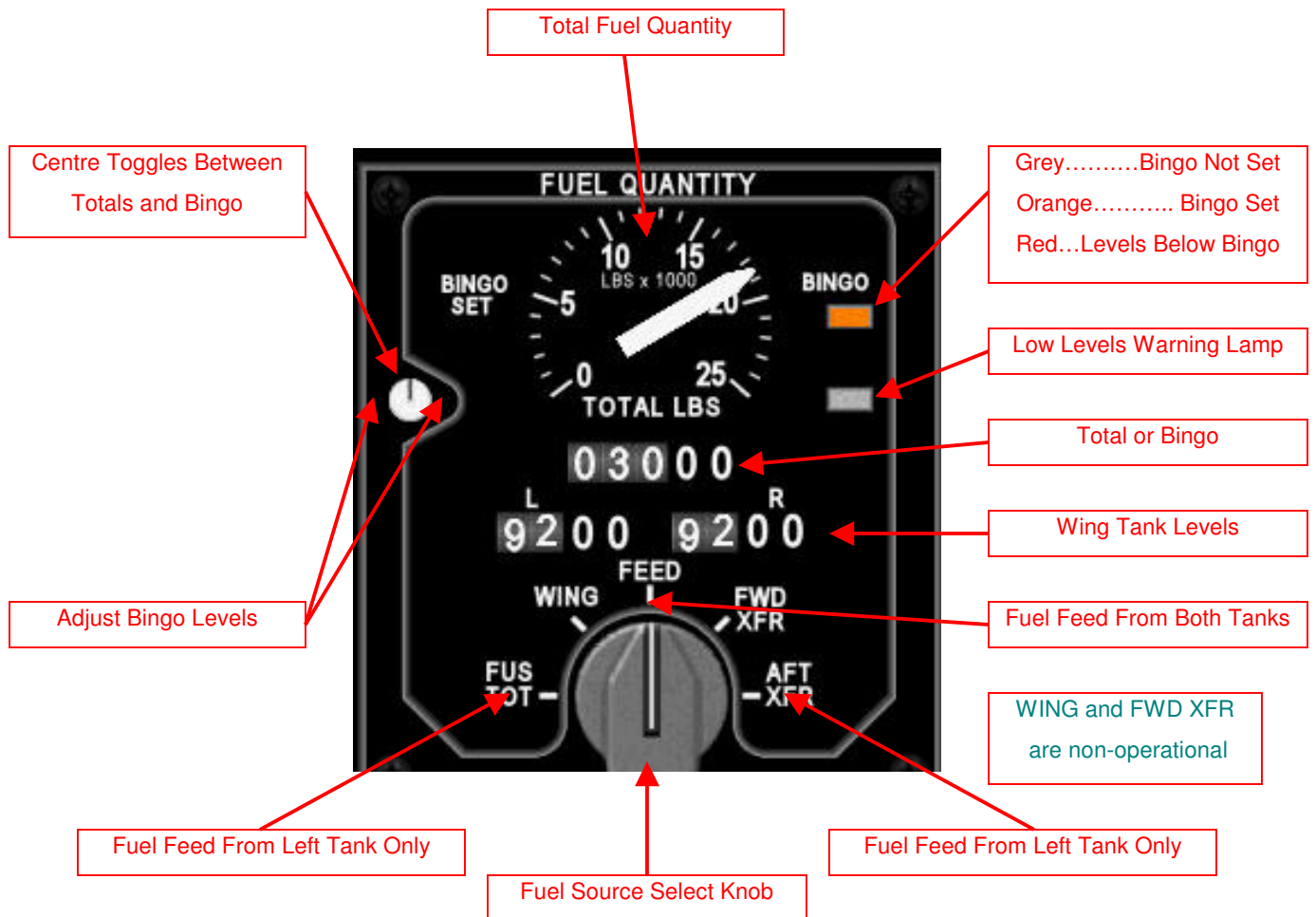
Canopy Control

Close by the G meter is a square illuminating button that toggles the canopy.

Engine and Fuel Gauges



The engine details displayed are self evident. The digital values are rolling numbers, except for the oil pressure values that are on disks.



The fuel gauge is somewhat more complex. The top dial displays the total quantity at all times (tool tip shows percent). The top rolling numbers can display both totals (default) and Bingo. Bingo is the quantity of fuel required to reach a landing destination. The pilot calculates the minimum quantity required. Click on the small knob centre and this toggles the readout to Bingo. Clicking to the right or left of the knob increases or decreases the amount shown. In the example shown, this is 3000 lbs. With this value set, the Bingo lamp changes from grey to orange. When the totals are just less than the Bingo value set the orange lamp changes to red. The pilot must then set a course for home. Tool tips help with these procedures. The tandem rolling numbers show each wing tank quantity. The large knob selects left, right or both tanks to feed the engines.

The second lamp below the Bingo lamp illuminates red when the selected quantity falls below 10%.



Here, Bingo was set to 19300 lbs and totals are below this value.



Here, the totals are less than 1000 lbs.

The Eyebrow Gauges



The lamps are as follows.

ELEC SYS. Illuminates when power is interrupted, except when the battery is off (all systems are off).

PROBE. Pitot icing. When illuminated, air temperature has dropped to icing levels. Switch on de-icing (this is covered later).

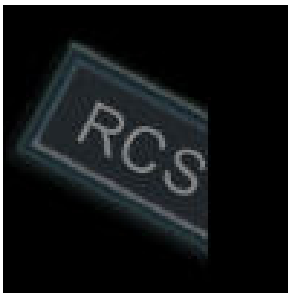
RADAR ALT. Illuminates when the aircraft altitude falls below the height setting bug value on the radar alt gauge.

MASTER CAUTION. Illuminates orange for CAUTION (low fuel, high negative vertical speed and the radio height is less than 200 feet while air speed is greater than 250 knots).

MASTER WARNING. Illuminates red for WARNING (stall and over speed). Clicking the lamp turns it off.

CHUTE. Illuminates green for auto set, red for deployed and blue for released.

OIL PRESS. Illuminates for low pressure.

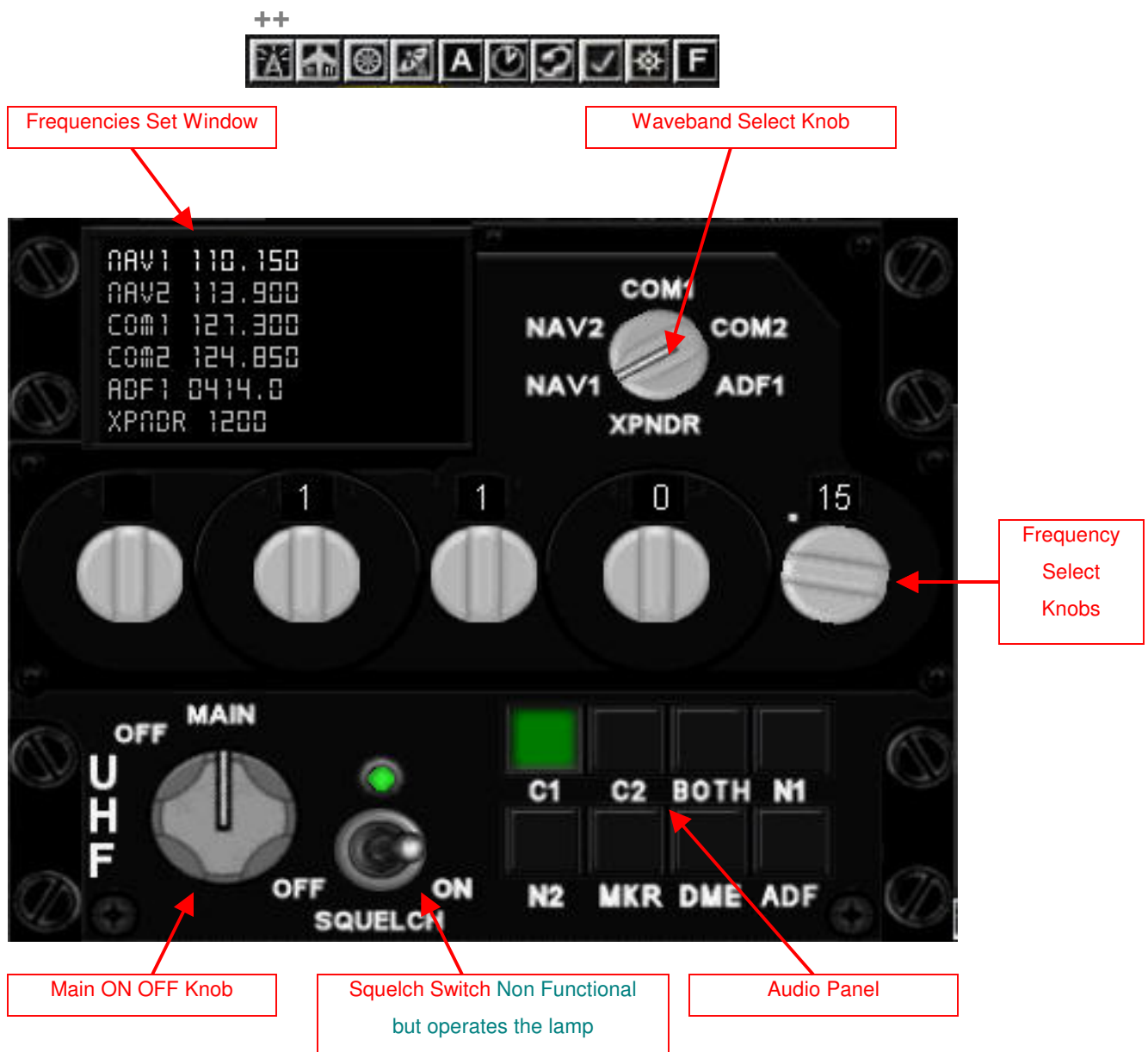


RCS (radar cross section). Illuminates if the aircraft can be detected on enemy radar. The relevant page on the PFD displays the reason, as does the tool tip for this lamp. This can be gear down, bomb bay doors open, antenna raised (radio on), tail hook and high angles of pitch and banking.

The Icon Bar Windows

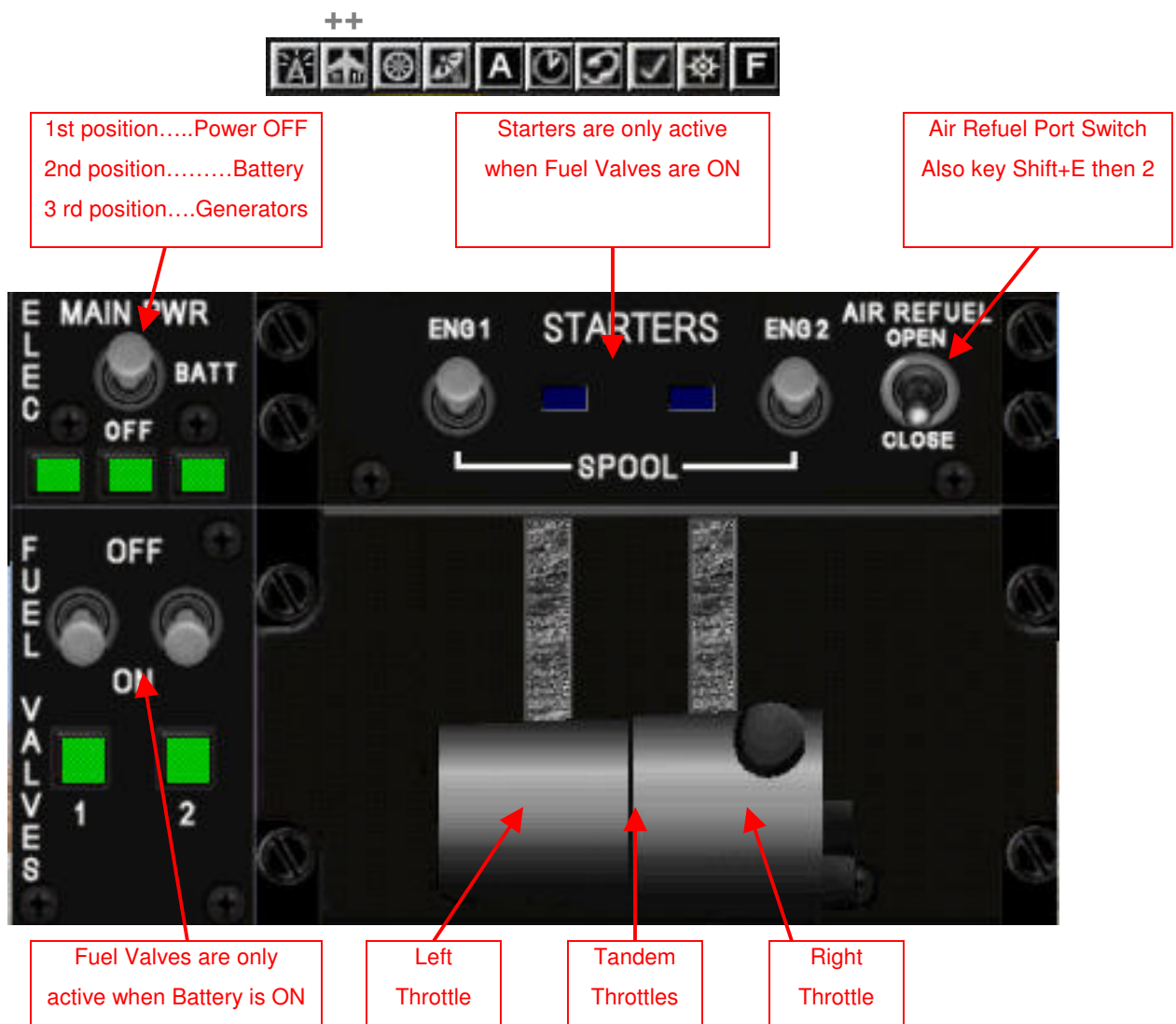
There are various pop-up windows (panels) activated by the Icon tool bar. These can also be opened using a combination of the shift + number keys (see F-117A Nighthawk Virtual Cockpit V2.0 document for further details). This is a good method when in spot plane view. The VC has its own set of icons. You are advised to read the VC documentation before moving to VC view.

Radio



Switch on using the large knob to 'MAIN'. This deploys the antenna and the aircraft can now be detected by enemy radar (the RCS lamp illuminates in the eyebrow cluster). Click on NAV1, NAV2, etc. to choose the type. The five frequency settings knobs will auto configure to suit the radio type chosen. Click to the left or right of the knobs to set the value above each knob. The square buttons make up the audio panel. The squelch switch is for realism, as FS2004 does cater for this feature. The frequency window was added for convenience. There would normally be a card in this position listing relevant frequencies. NOTE: All frequencies shown on this radio are active. Standby frequencies are not used in this type of radio.

ECU (Engine Control Unit) and Air Refuel



The throttles can be dragged individually or together by dragging in between the handles. Note, there is no reverse thrust on this aircraft, and hence the drag chute is used. Turn off each engine by switching off the fuel valves. Turn off the generators by clicking on MAIN PWR. This places the switch to the central position and the outer green lamps turn off. Then click OFF under the switch to turn off the battery. This disables the ability to click on any of the other switches and the MAIN PRW position.

The engine start procedure is:

Click on the switch in the ELEC section to the middle position to activate the battery bus. This activates the MAIN PWR area and the FUEL VALVES switches.

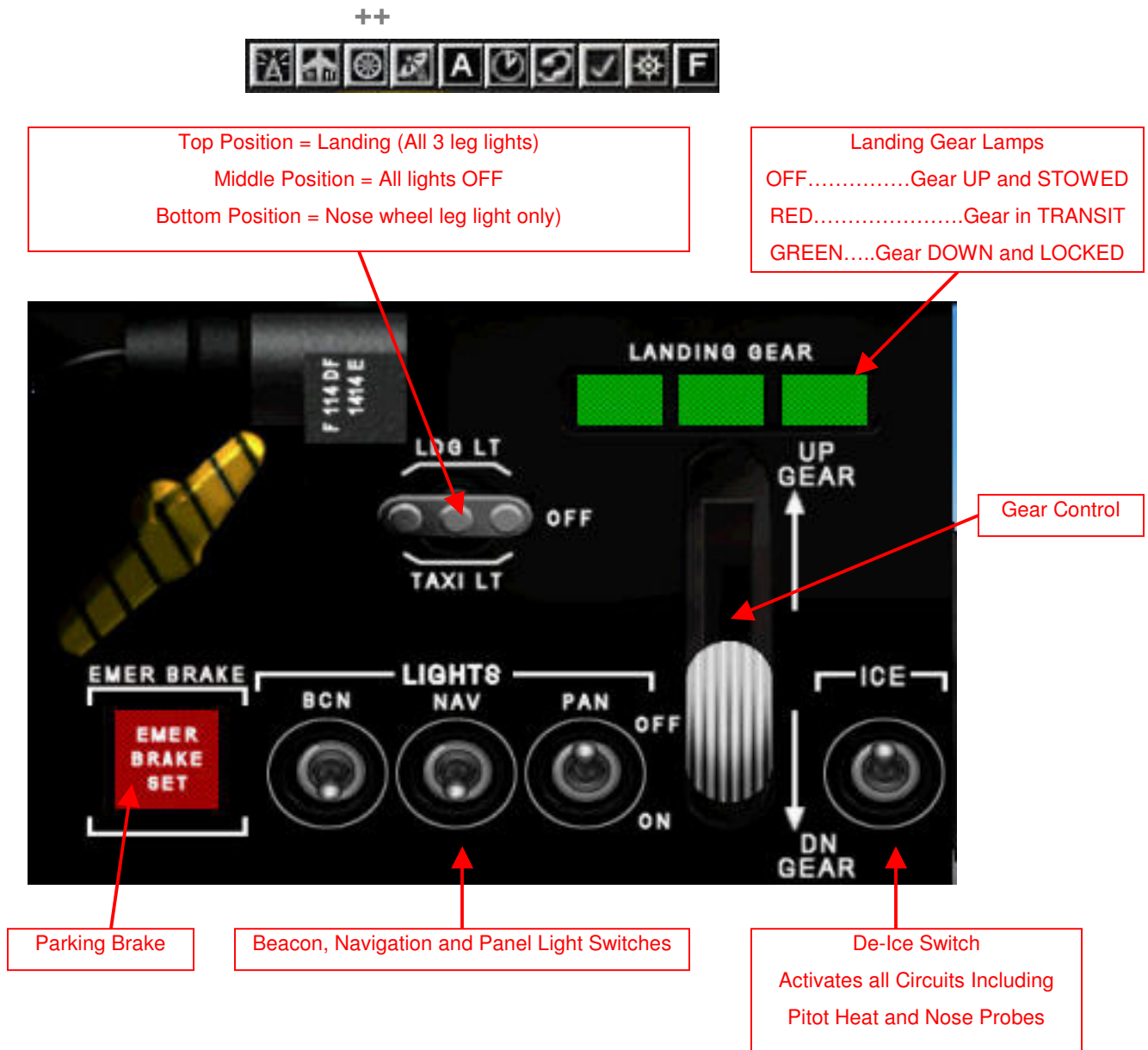
Click on a fuel valve, this activates the engine start switch. Click on the engine start and allow the engine to fire.

Click on the second fuel valve and start the second engine.

Click on the MAIN POWER area to activate the generators.

The air refuel switch operates the port doors, raises the refuel port and externally illuminates this area. Also the Ice lamps illuminate the engine air intake grills. These animations can be seen on the model. Also, the fuel levels are replenished to 100%.

The Gear Control, Brakes, Lights and Deice Panel



Click above the gear knob to raise the gear and below it to lower. When the gear is in transit, the 3 rectangular lamps and gear knob illuminate Red (also in the VC). When the gear is up the lamps extinguish. When the gear is down and locked, the lamps illuminate green.

The landing and taxi lights can be seen in all views being the Cockpit, VC, Spot Plane, Tower and Top-down view. Clicking on

LDG LT switches the landing lights on (all 3 legs), TAXI LT the taxi light (nose wheel leg light only) and the centre of the switch turns all the lights off.

The red brake button toggles the parking brake, and illuminates red when the brake is on. The other switches operate the beacon, navigation lights, panel lights and de-icing circuits (all, including Pitot probe).

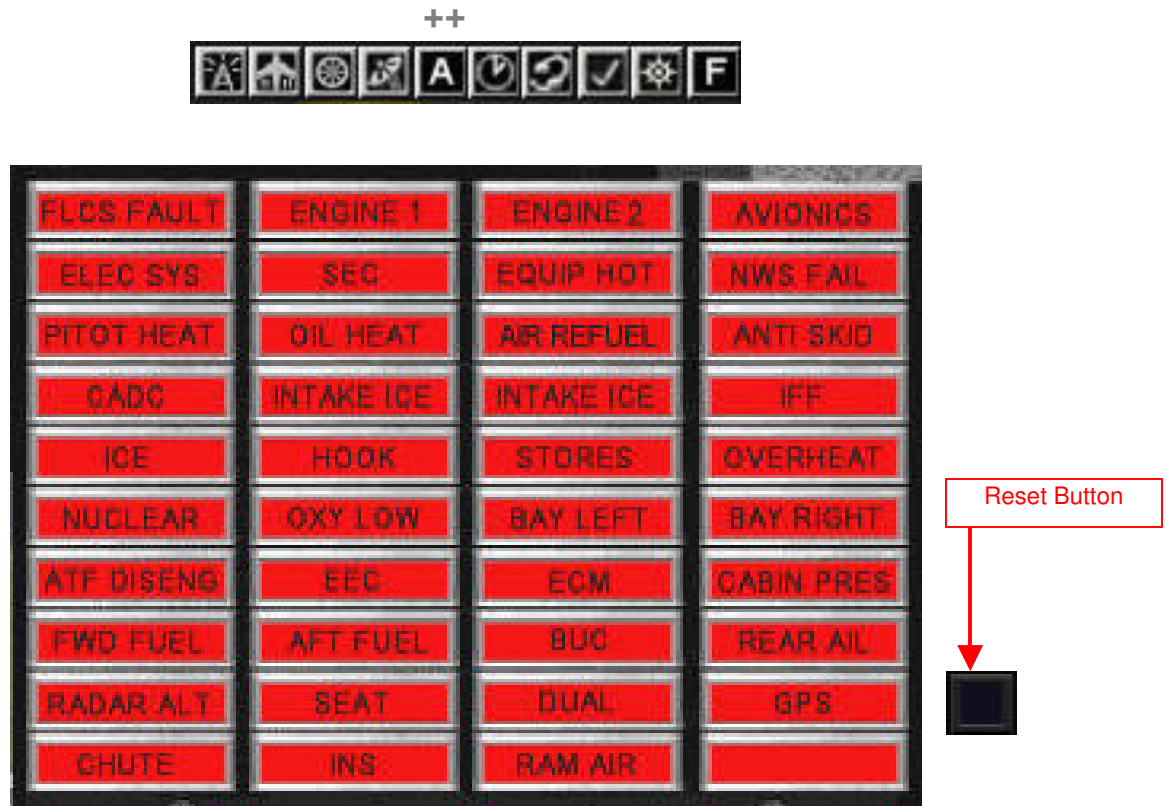
The panel light switch operates the gauges' internal illumination (including the HUD) and not the general cockpit lights. The latter can be switched in VC view using a switch close to main attitude indicator.

GPS



The GPS frame has been customised to suit the F-117. The operation is far too complex to be covered by this document. Please read the FS2004 help for assistance.

Annunciator Panel



The brightness and contrast of this picture has been enhanced to enable the buttons' text more readable in this document. Each lamp will illuminate individually when required to provide information to the pilot and to provide warnings. NOTE, the 'ICE' lamp remains illuminated even when the de-ice circuits are active, to remind the Pilot that icing would occur if the circuits are off. The 'RADAR ALT' lamp illuminates if the radar altitude bug has not been set. Please note that a small number of the lamps are non-operational due to the lack of certain features available in FS2004. A detailed explanation of each lamp is not given because those that work are self explanatory. The reset button turns this panel's functionality off for 5 minutes. The button will re-activate this panel if clicked before the 5 minutes elapses.

Clock and Stopwatch

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Stopwatch Activation



Hover the cursor over the small knob. The tool tip will show the mode. Default is clock mode and the local time is shown. Click this knob to change to stopwatch mode. The hands will point to zero. Click again to start the timer. Click again to stop the timer. Click again to reset back to clock mode. In Clock mode only, the second hand can be zeroed by clicking the large knob in its centre. Time adjustment is achieved as shown.

HOUR INC

MINUTE INC

ZERO Seconds (knob centre) Clock Mode Only

MINUTE DEC

HOUR DEC

Canopy Frame

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This icon toggles the canopy glass frame bars in the 2D view. A clearer scenery view is obtained.

ATC, Kneeboard and Map

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These functions operate in the usual way. See the FS2004 Help section for additional information if necessary.

The ATC icon also activates the ATC blue digits bar, thus:



You can click on each digit to navigate around the ATC menus instead of using the keyboard. If you do not require this function, click on the X to clear.

Additional Functions

The cabin light switch is for VC view only.

To the right of the HUD control panel is a seat height gauge.

Dragging up or down on the knob picture changes the seat height view and can assist when landing, for example, when the runway is difficult to see due to the high nose angle. The view can be reset by using the space bar.

To the left of the icon bar is a red 'S'. This switches the engine smoke on or off and also wing vortexes and vapour. It is on (red) by default. Clicking this turns the 'S' grey and the effects off.

As a final footnote, if you use a scenery mesh add-on, the terrain view in the MFD is much improved.



Have Fun!

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