EuCom Airlines
The knowledge VA

AIRCRAFT OPERATION MANUAL

Boeing B767 - 200

Number Of Airplanes : 1

Registration : D-AUKL Built : 1992 Configuration : Pax

History

Roll out	:	01. September 1981
First Flight	:	26. September1981
First Aircraft for EuCom Airlines	:	September 2001

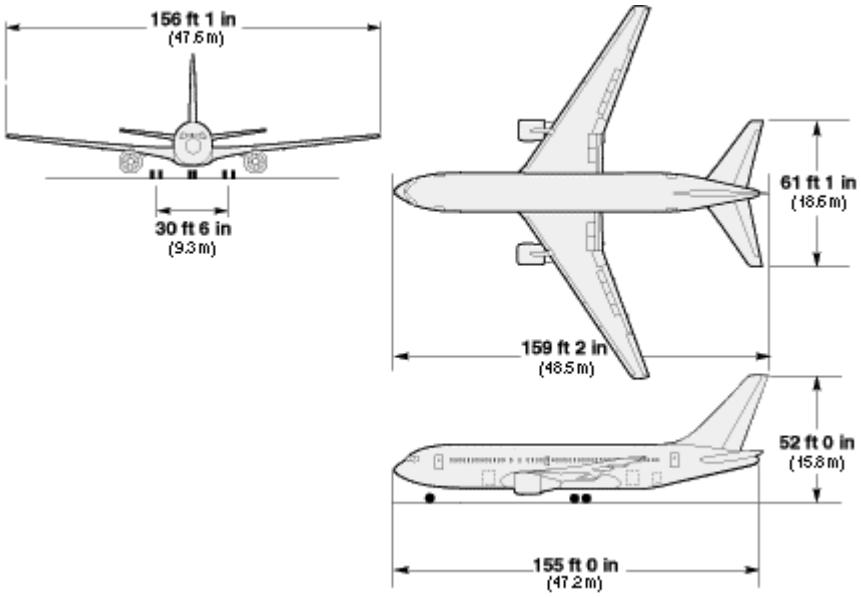
The 767 family is a complete family of airplanes providing maximum market versatility. The twin-aisle twinjet- is the most widely used airplane across the Atlantic, and is available in four models:

- the 767-200ER (extended range), with seating for 224 passengers in two classes or 181 passengers in a three-class configuration and range of up to 6,615 nautical miles;
- the 767 -300ER, with seating for 269 in two classes and 218 in three classes and a range capability of 6,115 nautical miles;
- and the 767-300 Freighter with 16,034 cubic feet of cargo volume and a range of 3,270 nautical miles.
- The newest member of the 767 family is the 767-400ER. The 767-400ER has seating for 304 passengers in two classes, or 245 passengers in a three-class configuration with a range of up to 5,645 nautical miles. Deliveries of the 767-400ER began in August 2000. The 767-400ER went into service in September 2000 with Continental Airlines and October 2000 with Delta Air Lines.

The Boeing 757 and 767 were the first, and still are, the only airplanes to share a common type rating. The common type rating is due, in part, to airplane systems that are designed such that a common set of flight crew operating procedures can be used. Airlines that operate both the Boeing 757 and 767 have greater flexibility in assigning flight crews and adapting to changing markets. They also benefit from similar maintenance procedures, manuals and inspection requirements and reduced spares inventories. More than 26 airlines around the world operate both 757s and 767s.

Technical Specifications

Dimensions



Seating

767-200ER	181 passengers in three classes
767-300ER	218 passengers in three classes
767-300	Freighter
767-400ER	245 passengers in three classes

Configurations

Seating ranges from five- to seven-abreast with two aisles.

Length

767-200ER	159 feet 2 inches
767-300ER	180 feet 3 inches
767-300 Freighter	180 feet 3 inches
767-400ER	201 feet 4 inches

Wingspan

767-200/-300/-300 Freighter	156 feet 1 inches
767-400ER	170 feet 4 inches

Tail height

767-200/300/-300 Freighter	52 feet 0 inches
767-400ER	55 feet 1 inches

Engines

767-200/-300/-400ER/-300 Freighter
Pratt & Whitney PW4000

767-300/-300 Freighter
Rolls Royce RB211-524

767-200/-300/-400ER/-300 Freighter
General Electric CF6-80C2B

Basic Max TO Weight

767-200ER	345,000 pounds
767 -300ER	380,000 pounds
767-300 Freighter	408,000 pounds
767-400ER	400,000 pounds

Fuel capacity 24,140 U.S. gallons

Maximum range

767-200ER	6,650 Nm
767 -300ER	6,150 Nm
767-300 Freighter	3,270 Nm
767-400ER	5,625 Nm

Altitude capability

767-200ER	37,900 feet
767-300ER	35,200 feet
767-300 Freighter	35,000 feet
767-400ER	34,700 feet

Cruise speed Mach 0.80 (530 mph)

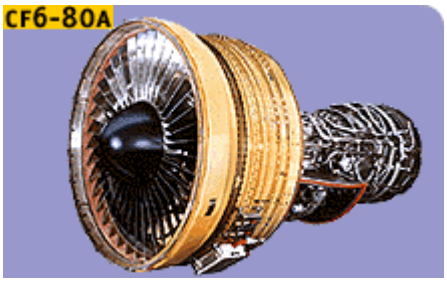
Cargo capacity

767-200ER	3,070 cubic feet
767-300ER	4,030 cubic feet
767-300 Freighter	16,020 cubic feet
767-400ER	4,580 cubic feet

Airplane Model	**Price (millions $)**
767-200ER	89.0 - 100.0
767-300ER	105.0 - 117.0
767-400ER	115.0 - 127.0

1999 Monthly Production Rate is 4 per qtr

Powerplant at Eucom FS2000 Models

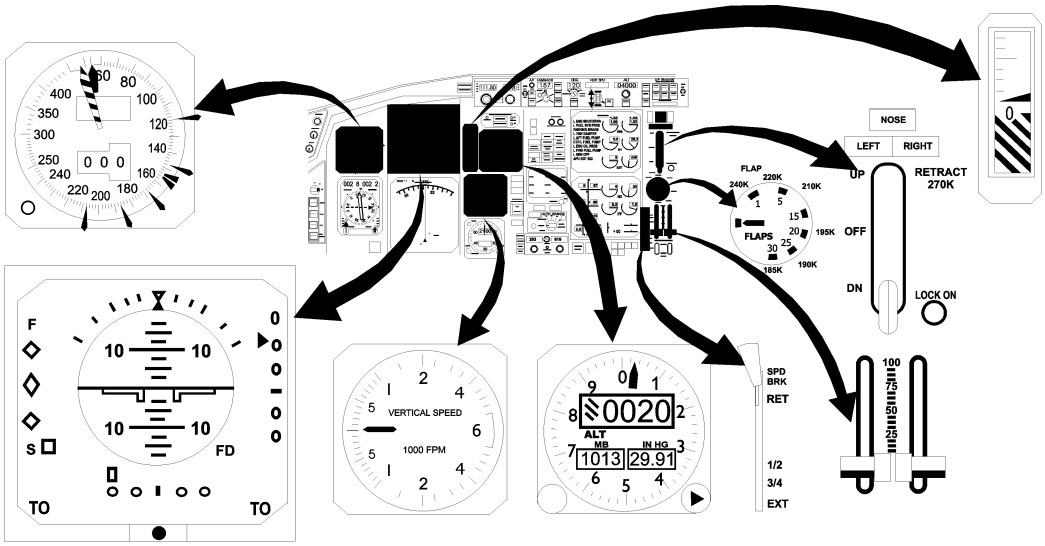


	767-200
Manufacturer	General Electric
Model	CF6-80C2B7F
Thrust	62,100 lb (28,169 kg)
Aircraft:	Airbus A310/300 Boeing B767-200 / 300
Introduction	1982
Production:	Out of Production
Eng. Length:	154.4 in.
Bypass Ratio:	4.7
Fan Diameter	86.4 in.
Pres. Ratio:	29.0

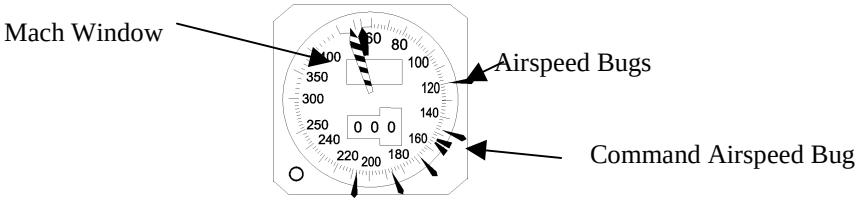
Description

The success of the CF6 commercial engine program firmly established GE as a major manufacturer of commercial jetliner engines. Capitalizing on the high bypass technology derived from the TF39 engine, the CF6 offered markedly quieter operation as well as significant performance and maintenance advantages over earlier engines.
The CF6-6, CF6-50, and later the CF6-80A were produced in large numbers, a majority of which are still in service today. GE Aircraft Engines is committed to supporting these earlier engines some of which were produced close to 30 years ago. In fact, GE Aircraft Engines is committed to supplying the resources necessary to bring cost effective solutions to our customers. New technology and materials are being infused into this mature engine line to insure that these CF6 engine models continue to meet the needs of our customers for years to come.

Basic Flight Instruments and Controls



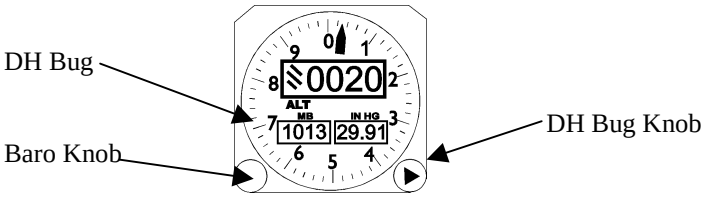
Airspeed Indicator



It has both rotating analog airspeed digits and rotating analog Mach number digits. The Mach number window does not become active until .400 Mach.

Also incorporated into the gauge are airspeed reference bugs and an autopilot set airspeed bug. The airspeed bugs are moveable using mouse click areas near the right edge of the gauge. They have a "memory" so that every time the panel is loaded they will be in their last assigned position. Additionally, when moving an airspeed bug and bumping into another airspeed bug they will all move along together. The autopilot airspeed bug is set using the AFDS IAS/MACH display window.

Altimeter



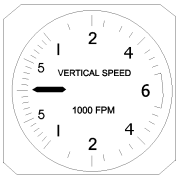
The altimeter setting is shown in both Millibars and Inches of Hg. The altimeter setting is adjusted by clicking on the left or right side of the BARO knob. Both MB and HG readouts will respond to the BARO knob movement.

The orange altimeter bug is a selectable Decision Height (DH) bug. Clicking over the left or right side of the DH Bug knob will cause the DH Bug to rotate around the altimeter. Additionally, there is a DH window in the EADI just above the digital Radio Altitude readout. The digital DH readout responds to movement of the altimeter DH bug and indicates the same value. When the aircraft reaches the radio height indicated in the DH window the radio altitude readout will change to orange and the GPWS system will call out "Minimums, Minimums".

Tape Radio Altimeter

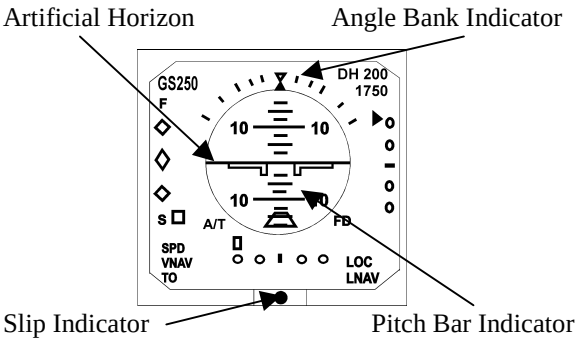
There are two radio altimeters. The digital readout located in the upper right corner of the EADI and the tape radio altimeter. The tape radio altimeter only reads out to 1,400ft. The digital readout displays altitude up to 2,500 feet above the ground.

Vertical Speed



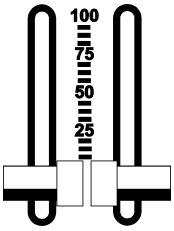
A Vertical Speed indicator is available and is calibrated to show assent or decent in thousands FPM.

Electronic Attitude Director Indicator

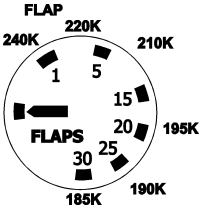


The EADI combines many functions into one instrument. Basic flight guidance is provided by an artificial horizon for pitch and roll control. At the bottom of the EADI is a slip indicator for yaw control. Description of the other functions of the EADI is provided in the Navigation Systems section of this manual.

Throttles



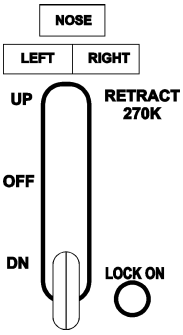
The two throttles may be operated together or when dragged with the mouse, independently. Reverse thrust is available.



Flaps

Flaps are operated by clicking on the gauge. A plus sign shown will lower the flaps and a minus sign will raise them.

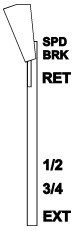
Landing Gear



Looking at the picture at left you will see outlined the mouse click areas. Box "1" is where you click for gear down. Box "2" is where you click for gear up. Box "3 is something new called the OFF position. Once the gear have retracted and you are climbing out the procedure is to put the gear handle in the OFF position. This cuts power to the hydraulic systems feeding the landing gear assembly. So clicking on "3" will bring the handle down to OFF (as shown). Box "4" is normally an override switch but we are using it as a test switch. Pressing it will test all the landing gear indicator lights.

A note about the Tail Skid light. Even though it illuminates during the test, it is non operational. This light only illuminates if the tail skid is out of position and the warning is suppressed during normal operations.

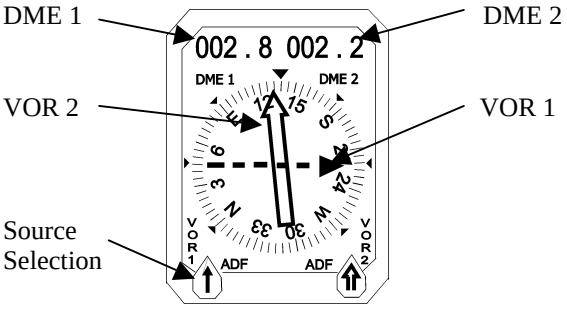
Spoilers



Just click and drag the spoiler handle to extend or retract the spoilers.

NAVIGATION SYSTEMS

RMI

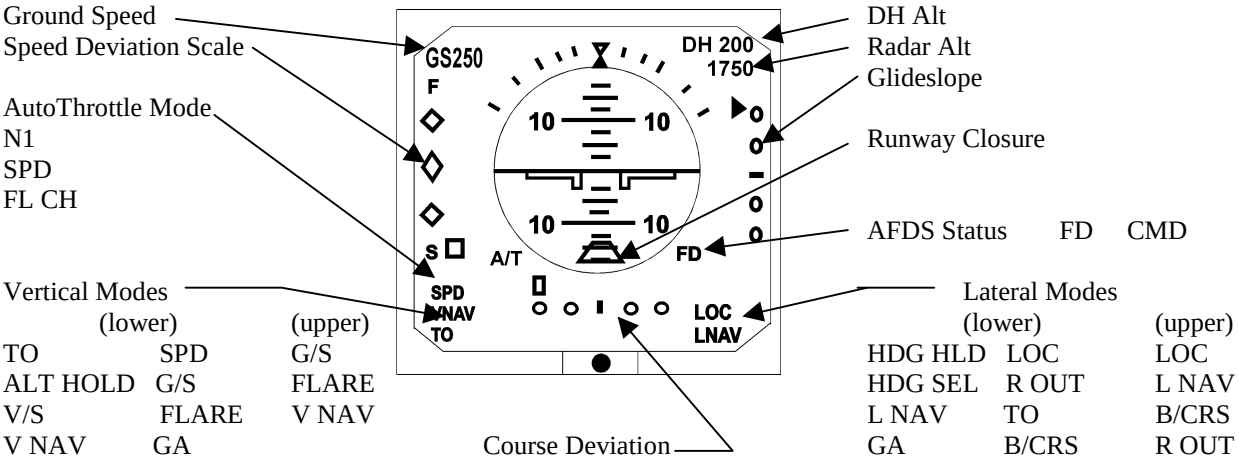


A significant feature of the RMI is the ability to select the Nav source for each course needle. Clicking over each knob will change position to indicate the Nav source and the corresponding needle will point accordingly. VOR 1 is the dashed arrow, VOR 2 is the outlined arrow.

VOR1, VOR2 and ADF are the allowable Nav sources. However, since there is only one ADF possible in FS2000 both pointers will point to the same ADF. DME 1 and DME 2 correspond to Nav 1 and Nav 2 information.

AFDS Status

Indicates the status of the autopilot. If the autopilot is engaged the green CMD annunciator will show. If the autopilot is not engaged but the flight director is in use a green FD would show. If the AFDS is in FD mode then the flight director bars will command your flight based on autopilot inputs. Therefore, the pilot can manually fly the aircraft and still have complete control of the flight director through the autopilot.



When the FD is engaged on the ground the AFDS goes into takeoff mode and the TO annunciators are indicated for both lateral and vertical modes. The flight director commands runway heading and a pitch attitude for positive rate of climb. After takeoff a different lateral and vertical modes would be selected to continue the flight. The same is true for a go-around. GA would be annunciated for both modes and would be cleared on climbout through selection of different modes.

Lateral Modes

The lateral mode selected on the autopilot is annunciated in the lower right corner of the EADI. The upper position (white) shows the armed mode. For example, if in heading hold (HDG HOLD) mode and the localizer (LOC) is selected to capture the white LOC and the green HDG HOLD would show. When the aircraft intercepts the localizer the white LOC will disappear and a green LOC will appear in place of HDG HOLD. This indicates the autopilot is now tracking the localizer.

The ROLL OUT annunciator is associated with the autoland capability of the aircraft. When in a CAT II or CAT III situation and using the autoland's Land 2 or Land 3 function (explained later) a ROLL OUT annunciation will be seen which indicates the aircraft is ready to (white) or is performing (green) the runway rollout procedure. Because of space constraints the ROLL OUT annunciator appears as R OUT.

Vertical Modes

The vertical mode selected on the autopilot is annunciated in the lower left corner of the EADI. The upper position (white) shows the armed mode. For example, if in altitude hold (ALT HOLD) mode and the approach mode (APP) is engaged there would be a white G/S annunciator to indicate arming for glideslope capture on top of the green ALT HOLD annunciator. Then upon glideslope intercept the white G/S will disappear and the green G/S will appear in place of the ALT HOLD annunciator. This indicates the autopilot is now tracking the glideslope path.

The FLARE annunciator is associated with the autoland capability of the aircraft. When in a CAT II or CAT III situation and using the autoland's Land 2 or Land 3 function, the FLARE annunciation which indicates the aircraft is ready to (white) or is performing (green) the FLARE maneuver, will illuminate. Additionally the autothrottle will annunciate IDLE during the flare.

Radar Altitude

A digital radar altitude displays actual height above the ground up to 2,500 feet. Between 500 and 2,500 feet the display is calibrated at 50 foot increments. Below 500 feet the calibration becomes 10 feet. There is a DH window that is adjusted using the altimeter DH bug adjustment. When the radio altitude is below the selected DH the digits turn orange.

Speed Deviation Scale

Commonly known as the fast/slow gauge, this display will show how far off the aircraft is from the autopilot selected airspeed. If too fast the pointer goes to the F side. If too slow the pointer moves toward the S side. It is calibrated at +/- 10 kias.

Runway Closure Indicator

When in the Approach mode and below 200ft AGL, a small runway symbol will appear in the EADI and will gradually rise up into the pitch bar as you close in on the ground. This is a nice backup in low visibility to give you yet another indication that ground contact is coming. This symbol we have here is not 100% accurate for the 767 but it does the job.

Course Deviation Indication (CDI) and Glideslope Scales

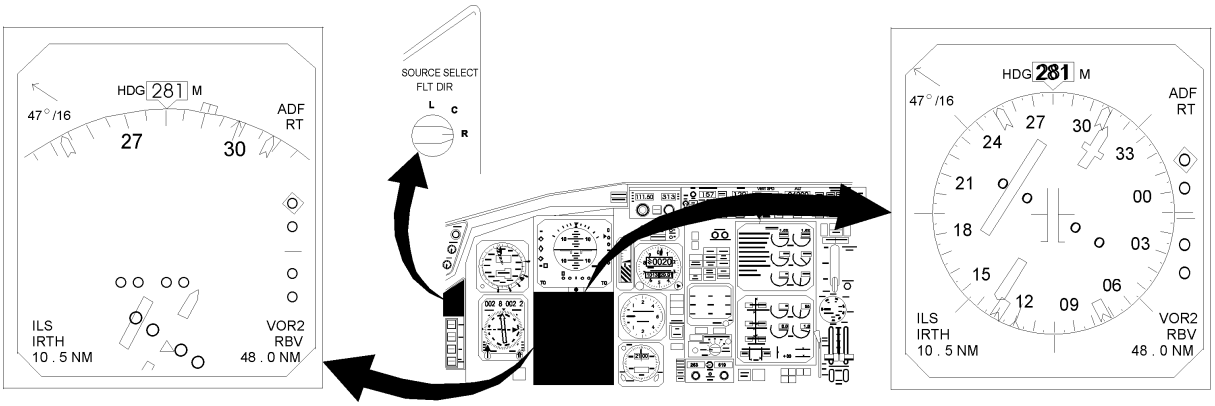
When tuned to a VOR there will be a course deviation scale. The Glideslope scale is only present when a valid ILS is tuned in.

Flight Director

The flight director only requires to be turned on/off with the FD switch on the AFDS panel. When turned on a horizontal and vertical pink bar will appear on the face of the EADI.

The flight director uses a double cue with 2 bars. The basic idea is to adjust aircraft pitch and roll so that the pink Pitch Bar (horizontal line) and pink Roll Bar (vertical line) are always centered. Pitch towards the bars to center them.

ELECTRONIC HORIZONTAL SITUATION INDICATOR (EHSI)



Rose Mode

(See Figure 1)
The default mode of the EHSI is the ROSE mode. When the Source Select knob is on "R" the ROSE mode is displayed.

1) NAV 1 Source: This shows NAV1 information for the frequency and course selected on the NAV1 autopilot panel. The symbol on top is the symbol of the RMI style pointer in the EHSI. The next line is the name of the nav source. The third line is the DME range to the Nav source.

2) NAV 2 Source: This shows NAV2 information for the frequency selected on the NAV2 radio panel. The same information is provided as explained for NAV1.

3) ADF Source: This shows ADF information for the frequency selected on the ADF radio panel. Only the name of the ADF is provided. The Course deviation indication (CDI) is shown in pink and is tied to Nav1 only.

The top left corner has as wind speed/direction indication. In figure 6, the wind is shown as 047 degrees at 16 knots.

Arc Mode

(See Figure 2)
The ARC mode is selected by moving the knob to the "C" position as shown. The ARC mode displays the same exact information as the Rose mode. The only difference is in the way the information is displayed. The CDI can used in the EADI as a backup.

Off Mode

Turn the EHSI off by selecting the "L" position on the selector knob. This way the EHSI is not taking up resources for those that use some sort of external FMC such as NavDash 2.5 or EFIS98.

ROSE MODE

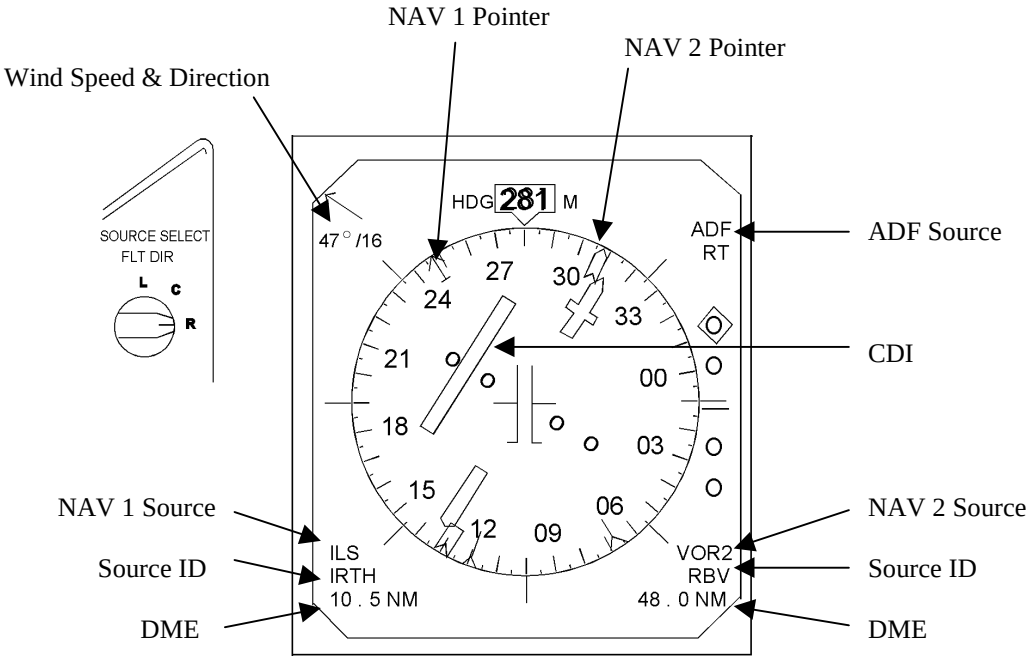


Figure 1

ARC MODE

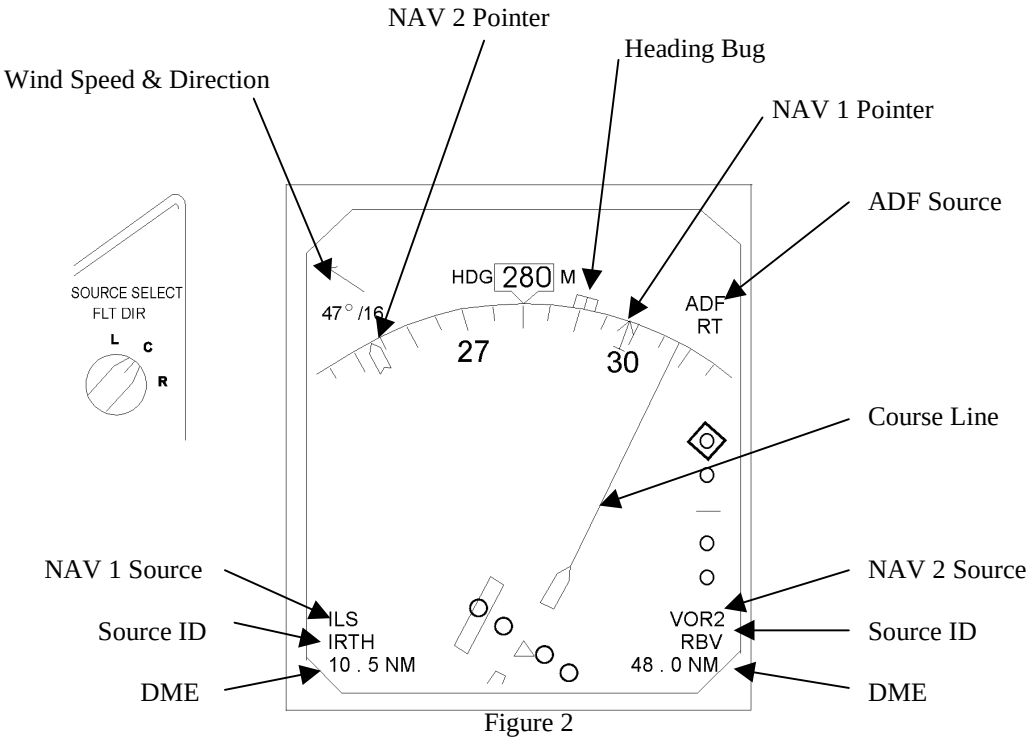
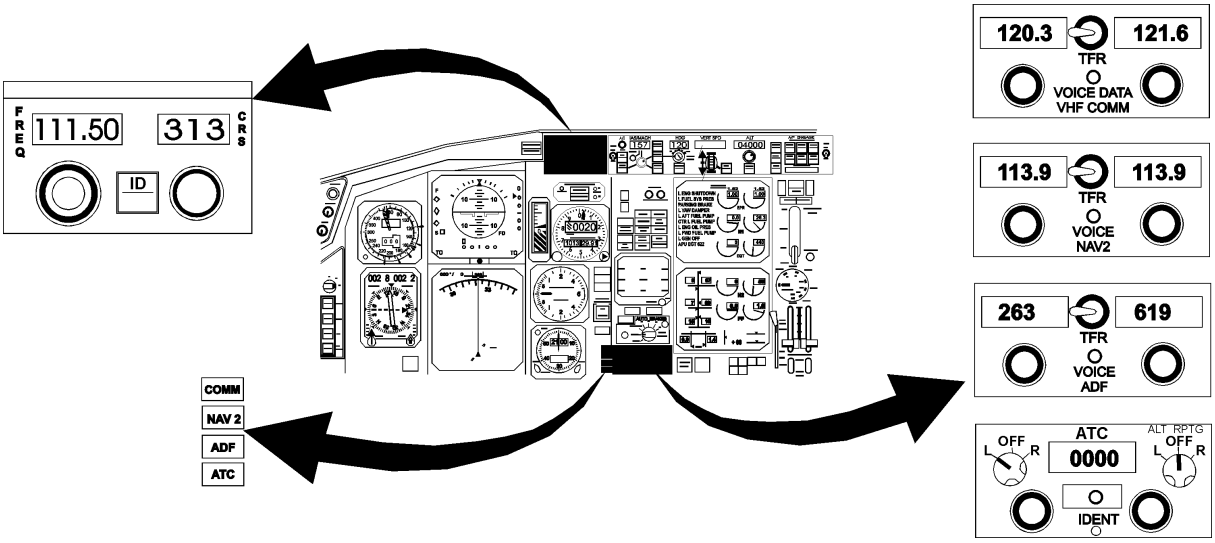
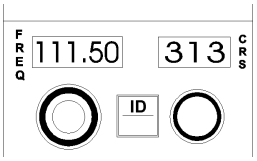


Figure 2

COMMUNICATIONS

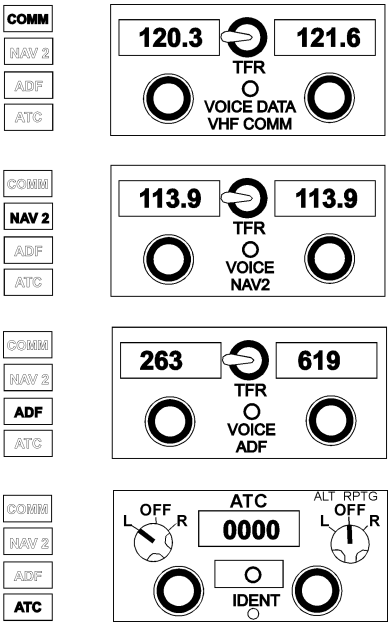


Nav 1 Receiver



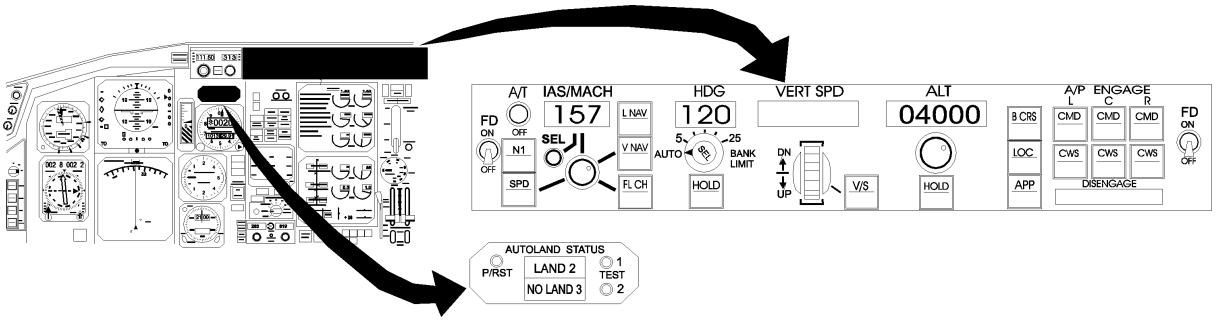
Just to the left of the autopilot is the Navigation receiver for Nav1. Input for frequency and course for Nav1 is on this unit. The mouse click areas are left and right of each knob. When inputting a Nav frequency it does not become active right away. It is activated by clicking the center of the NAV frequency knob. This method allows an active frequency and to also select a standby. To determine which frequency is active look at the EHSI display for the VOR/ILS identification.
Clicking on the ID switch enables the "ident" feature which allows the pilot to listen to the morse code identification of the selected frequency.

Radios



There are four separate radios that are selected using the switches on the left side of the radio. The COM, NAV and ADF radios have both "active" and "standby" frequency windows. The active frequency is determined by clicking on the transfer switch (TFR). Standby and active frequencies can be changed at anytime. The active frequency window will become highlighted. Each knob has mouse click areas to the left and right of the knob for the changing of frequencies. The ADF radio also has a click area in the center of the knobs.

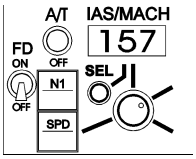
AUTOPILOT FLIGHT DIRECTOR SYSTEM (AFDS)

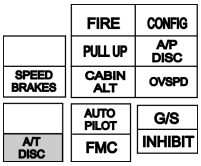


The AFDS has six basic functions. An autothrottle, altitude management, heading management, navaid tracking, approach and autoland systems. A single Mode Control Panel (MCP) provides control of the AFDS. The AFDS is turned on by clicking the F/D toggle switch to ON. The MCP has mode selector switches that are operated by a click of the mouse. A light bar in the lower half of a mode switch will light up to indicated that that particular mode has been activated.

There are three autopilot systems designated as channels L, C and R. To engage the autopilot select any 1 of the 3 autopilots by clicking the corresponding CMD button. To disengage the autopilot just click the "DISENGAGE" bar one time and then a second time to cancel the warning. Multiple autopilot operation is possible in APP mode only and provides an autoland feature.

Autothrottle Modes





AUTOTHROTTLE ARM SWITCH
The autothrottle is engaged from the MCP using the switch labeled "A/T". The EADI will also annunciate the engagement of the autothrottle with a green A/T. Once the autothrottle is engaged the autopilot will control all power changes. It will adjust power to maintain the selected airspeed in the following modes: SPD, FL CH and VNAV.

N1 SWITCH
This mode is used primarily for takeoff or climb and is not tied to the airspeed value. It will set the power to the max available N1 setting. In this panel it is a pre-programmed value. The airspeed in the IAS/MACH window will not be maintained by the autothrottle in this mode.

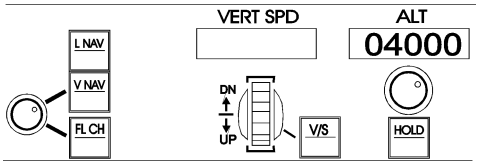
AUTOTHROTTLE DISCONNECT LIGHT
Illuminates when autothrottle becomes disconnected.

IAS/MACH DISPLAY
To adjust the airspeed value use the mouse clicks next to the knob. Power will be adjusted and the airspeed will be maintained by the autothrottle in SPD, FL CH or VNAV modes.

IAS/MACH SWITCH
Selection of IAS or MACH is done by clicking the SEL button.

SPD SWITCH
This mode is used by the V/S and ALT HOLD mode. SPD mode will cause the autothrottle to maintain the proper power required to maintain the speed selected at the autopilot. Most of the time this mode will automatically select with the selection of a vertical mode.

Altitude Management Modes



In addition to an altitude hold function there are three methods to change altitude with this autopilot: VNAV, FL CH and VERT SPD. When a new altitude is selected the aircraft "remembers" the last assigned altitude and will only start to climb/descend when a vertical change mode is selected.

VNAV
The VNAV button will cause climbs and descents at a fixed rate while maintaining the selected IAS/MACH. It will also maintain the selected altitude in the ALT window. If the VNAV is maintaining a pre-selected altitude and a new altitude is set, the autopilot will not initiate a climb/descent until the ALT button is pressed. VNAV overrides the ALT HLD mode when VNAV is in use. When in VNAV mode and selecting a new altitude, the ALT select knob must be clicked to initiate the vertical movement. Additionally when arriving at the selected altitude the aircraft remains in VNAV mode instead of changing to ALT HLD. VNAV will override ALT HLD.

FL CH
Flight level change mode is used for airspeed dependant climbs or descents. For climbs the AFDS pitch control maintains pitch for selected airspeed and the autothrottle maintains climb thrust. For descents the power is reduced to flight idle while the AFDS adjusts pitch to maintain airspeed.

VERT SPD
If vertical speed is not being used the VERT SPD display will be blank. The VERT SPD window only becomes active when the V/S mode is engaged by pressing the V/S button. When flying at the altitude selected in the ALT window the V/S mode will not engage. To change altitudes using vertical speed select a new altitude in the ALT window. Then press the V/S button at which time 0000 will appear to indicate the plane is in level flight and is ready to start a climb/descent. Adjust the desired rate using the mouse click area on the control wheel.

If a climb/descent using FL CH or VNAV has been started the climb may be continued using vertical speed mode at any time by pressing the V/S button. The current V/S will be shown in the VERT SPD window and can then be adjusted. Selection of vertical speed mode causes the autothrottle to automatically select SPD mode.

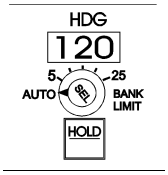
Altitude Hold
The altitude set in the ALT window is an "armed" altitude. When reaching this altitude using FL CH or V/S mode the aircraft will level off and enter the altitude hold mode (ALT HLD). VNAV does not use ALT HLD since it manages this function itself.

The altitude displayed in the ALT window is changed using the mouse clicks on either side of the knob. Once the altitude in this window is set the aircraft will not change modes or start any vertical movement until vertical mode is selected. If a new altitude selected and no other modes are selected the aircraft will remain in ALT HLD mode.

The aircraft can be leveled at any time by pressing the HOLD button at which time the HOLD bar will light up and ALT HLD will annunciate on the EADI. In this case the aircraft will level off at the current aircraft altitude regardless of what is displayed in the ALT window. A climb/descent can be continued by selecting another vertical mode.

The ALT HLD mode is overridden by VNAV when VNAV is in use.

Heading Modes



The AFDS has 2 separate heading hold modes: Heading Hold (HDG HLD) and Heading Select (HDG SEL). Additionally there is a bank limiter that functions to limit the bank in a turn to 5, 10, 15, 20, and 25 degrees.

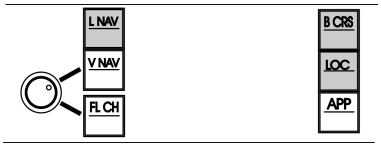
HDG WINDOW
The heading in this window is selected using mouse click. The heading displayed in the HDG window is the heading the autopilot will roll to and maintain in HDG SEL mode.

HDG HLD
This mode is engaged by pressing on the HOLD button. The autopilot will maintain whatever heading the aircraft is currently on regardless of the heading selected in the HDG window. This mode allows selection of any heading in the HDG window without the aircraft following the change.

HDG SEL
This mode is engaged by pressing the SEL button which is incorporated into the heading knob. With HDG SEL the autopilot will roll to and maintain the heading selected in the HDG window. The autopilot will also follow any new headings selected in the HDG window as well.

BANK LIMIT
The degrees of bank that the autopilot will command is set by changing the "bank limit When the little black tick mark is pointed at AUTO the bank limit is calculated based on airspeed and altitude. To select 25 press on the mouse click area over "25". To move the tick back toward AUTO press on the mouse click area over "5". The default setting is AUTO.

Navaid Tracking Modes



LNAV
Lateral navigation is normally associated with an FMC (just like VNAV). But since the FS2000 B767 does not have an FMC the LNAV mode is set to function as a VOR tracking mode. Engaging LNAV will cause the autopilot to intercept and track the currently selected Nav 1 VOR course.

BCRS
Selection of BCRS will cause the autopilot to track a localizer backcourse approach. A white B/CRS means it is 'armed' for backcourse interception and that HDG SEL mode is active. Upon intercept the B/CRS would move down and turn green to indicate it is the active mode.

LOC
Selection of LOC will cause the autopilot to track the localizer only. It will not pick up the glideslope even if available. This mode is used to fly a localizer only approach or to intercept the localizer when you have not yet been cleared for the full ILS approach. The EADI example shows the LOC mode in green which means it is the active lateral mode and the autopilot is tracking the localizer course.

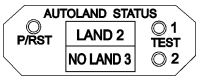
Approach Mode

APP
The approach mode is used for flying an ILS approach. Selection of APP arms the LOC and G/S capture. Until the localizer and glideslope are captured the ALT HLD and HDG HLD modes are still active. This is considered a 'Category 1' approach without any autoland capability because only one autopilot is engaged.

Once the APP mode is engaged using a single autopilot operation, the only methods to disengage it are:

1. Selection of go around (Ctrl-Shift-R)
2. Selection of both the HDG HLD and ALT HLD.
3. DISENGAGE the autopilot.

Autoland MODE



The 767 is capable of a complete autoland through the use of multiple autopilot operations. With the selection of two or more autopilots for an approach (in APP mode) the autoland capability is armed. There are two types of autoland situations: LAND 2 and LAND 3.

The autoland sequence begins upon issuance of the approach clearance. At some point above 1,500 ft AGL the APP mode must be selected by the pilot. At this time if an autoland is desired then the selection of additional autopilot channels also be done. Once two or more autopilots are selected the autoland capability is armed. There will be no notification of autoland status until 1,500ft AGL.

At 1,500ft radio height the AFDS does a system test to determine if all of the criteria are met for an autoland to occur. Once the computer is satisfied, it will provide notification in the AUTOLAND STATUS window. If the criteria are not met for an autoland there will be a red "NO AUTOLAND" notification and a regular Category 1 approach will continue.

At approximately 80 KIAS in the rollout the autopilot will automatically disengage and the plane must be controlled manually.

Once a LAND 2 or LAND 3 indication is present in the AUTOLAND STATUS window, the only way to cancel the autoland function is via a go around (Ctrl-Shift-R) or disengaging the autopilot.

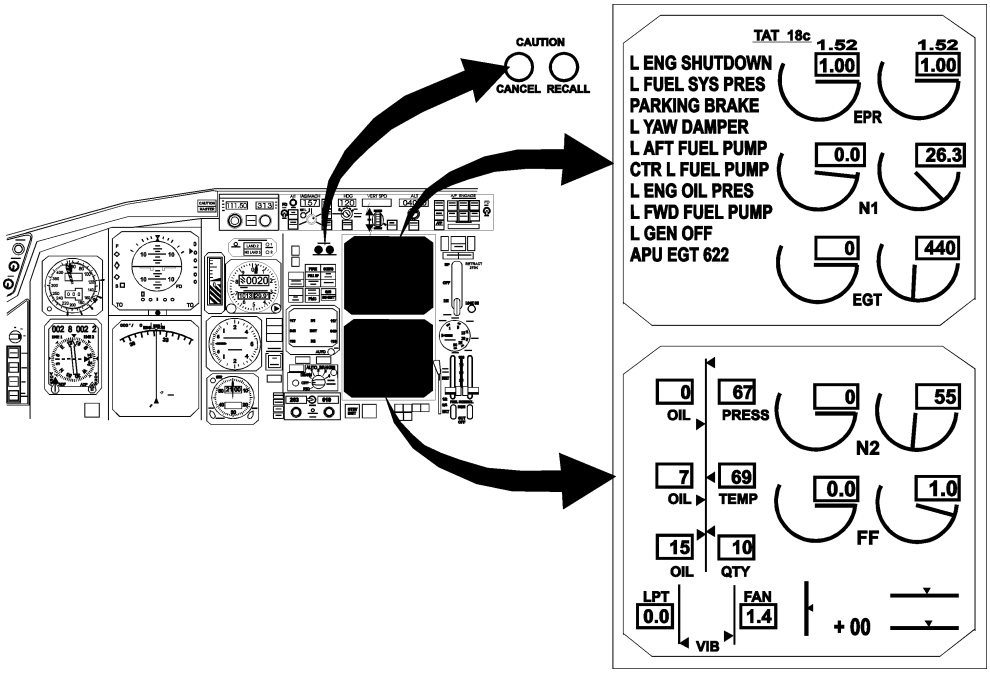
LAND 2
This situation is created through the selection of 2 autopilots when in APP mode prior to 1,500ft AGL. This will result in a successful autoland and rollout. This mode is called LAND 2 because there are only two autopilots operating thus creating a decreased level of redundancy over three autopilots.

LAND 3
This situation is created through the selection of all three autopilots when in APP mode prior to 1,500ft AGL. This will also result in a successful autoland and rollout. This mode gives the greatest level of redundancy and safety when performing a Cat III approach.

TEST SWITCHES
Pressing TEST 1 will cause LAND 3 and NO AUTOLAND to appear in the upper and lower windows. Pressing TEST 2 will cause LAND 2 and NO AUTOLAND to appear in the upper and lower windows.

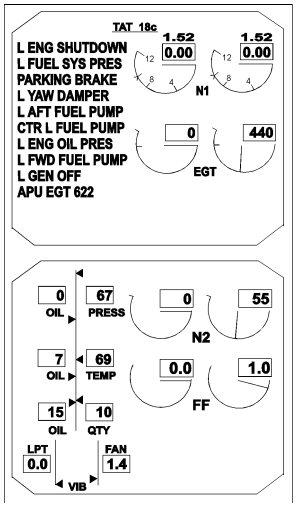
P/RST SWITCH
Resets pilot's annunciators.

ENGINE INDICATION AND CREW ALERTING SYSTEM (EICAS)



The engine gauges are available in three versions as selected during FS98 installation. The crew alerting system (CAS) annunciates failures and other systems related conditions.

Engine Indicators



There are three versions of engine gauges. The first one is for aircraft with General Electric engines installed. GE engines measure power using N1 and thus do not have an EPR gauge. The second type available is for aircraft with P&W and the third is when Rolls Royce engines are installed. These engines measure power using primarily EPR with N1 as a backup.

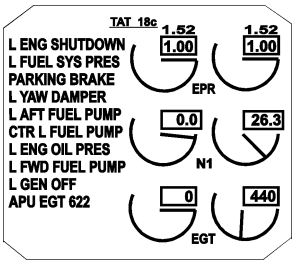
There is a power lever index located on each set of engine gauges. On the GE engine gauges there is a small yellow pointer with a green V attached to it. On the P&W engine gauges this pointer is located on the EPR readout. This pointer indicates the position of the power levers and should correspond to the value shown on the gauge for power output except when making power changes. This gives an indication of roughly where the power setting will be when adjusting the throttles.
The VIB gauges display measured vibration for the engines.

Engine Gauges at Startup

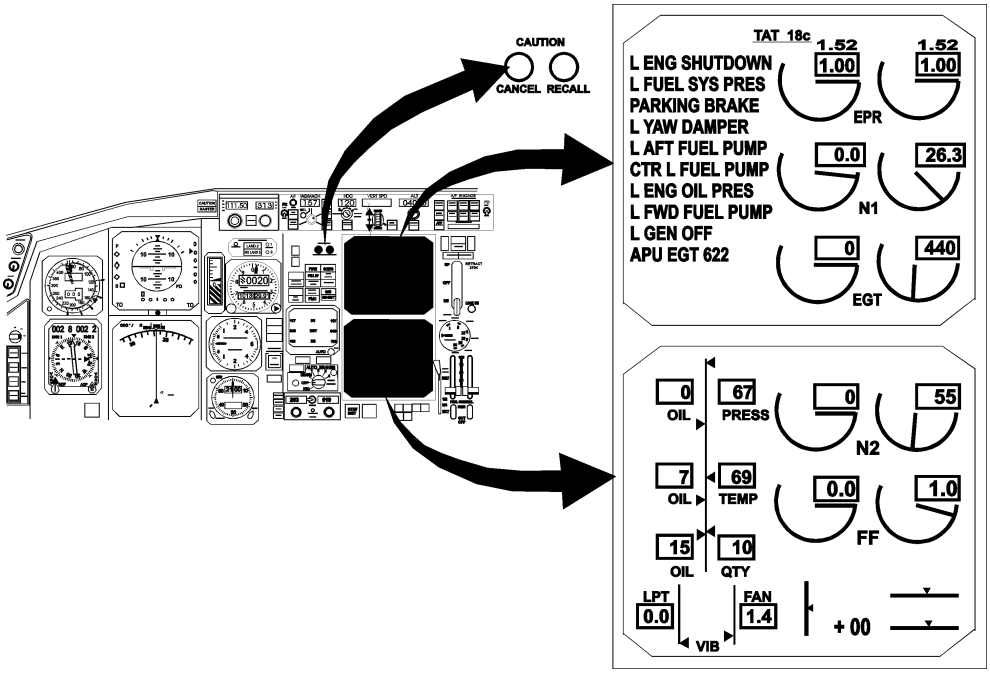
Some of the engine indications are driven by an engine alternator (electrical source) and will not start to indicate until this power source is available which occurs at around 15% N2. So the "blank" values are not mistakes, they are normal system indications.

EPR reference numbers on top of the EPR gauge reflect the maximum EPR value for that phase of flight based on altitude and temperature.

CREW ALERTING SYSTEM (CAS)



The centralized warning system (CAS) gives the pilot information about problems, incorrect settings, or just advisories about the status of the aircraft and it's systems. The CAS is completely tied to the expanded overhead panel systems and annunciates the condition of the systems on the overhead.



The CAS has only the important warnings and messages that relate to the systems simulated in FS98. Most of these messages relate to normal systems operation and do not advise of malfunctions which are not simulated in FS98. There are three types of messages displayed on the CAS: WARNINGS, CAUTIONS, ADVISORIES.

WARNINGS: These are items that require immediate action. Most involve some type of fire, smoke or catastrophic failure. The warnings are displayed in RED on the EICAS and can only be cleared by correcting the problem denoted. The following warnings are implemented in this version of the CAS:

PARKING BRAKES	Parking brakes are on and takeoff thrust has been applied.
SPOILERS	Spoilers are not in the proper position for takeoff.
FLAPS	Flaps are not in the proper position for phase of flight.
GEAR NOT DOWN	If the gear is not selected down for landing.
OVERSPEED	Flying too fast. Above Vmo.
CABIN ALTITUDE	If above 10,000ft and there is no bleed air source to pressurize the cabin.
AUTOPILOT DISC	Autopilot disconnected.

CAUTIONS: Items that require a timely response. Most involve some mis-configuration of a system. The cautions are displayed in amber and can be cleared using the CANCEL button. The following cautions are implemented in this version of the CAS:

LAC BUS OFF	This electrical bus is not powered.
R AC BUS OFF	This electrical bus is not powered
ALTITUDE ALERT	Off by more than 300ft from selected autopilot altitude after capture.
L ENG SHUTDOWN	Illuminates when engine is shut down.
R ENG SHUTDOWN	Illuminates when engine is shut down.
L FUEL SYS PRES	Both main fuel pumps pressure is low.
R FUEL SYS PRES	Both main fuel pumps pressure is low.
LOW FUEL	Less than 2,200lbs of fuel in either main tank.
L BUS ISOLATED	Isolation bus tie automatically or manually opened.
R BUS ISOLATED	Isolation bus tie automatically or manually opened.

ADVISORIES: Items that require action on a time available basis. Most involve the configuration of a system on the overhead panel. Many are normal depending on the pilots operation of the aircraft. The advisories are displayed in yellow and can be cleared using the CANCEL button. The following cautions are implemented in this version of the CAS:

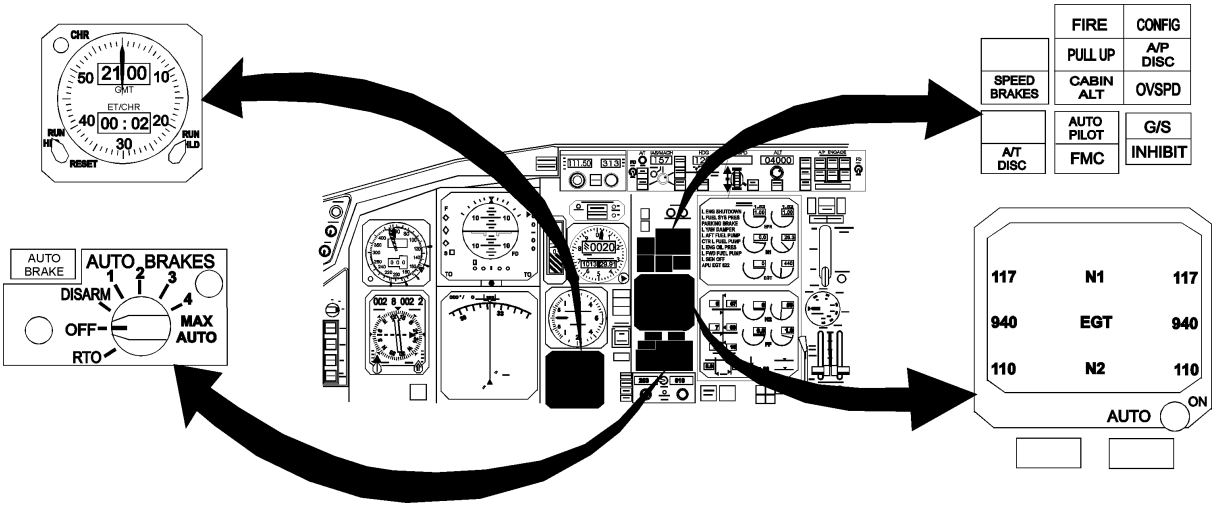
L FWD FUEL PUMP	Forward fuel pump pressure is low or switched off.
R FWD FUEL PUMP	Forward fuel pump pressure is low or switched off.
L AFT FUEL PUMP	Aft fuel pump pressure is low or switched off.
R AFT FUEL PUMP	Aft fuel pump pressure is low or switched off.
CTR L FUEL PUMP	Center fuel pump pressure is low. Inhibited when center pump switch is off.
CTR R FUEL PUMP FUEL CONFIG	Fuel imbalance or center pumps are off with more than 1,200 lbs fuel in center tank
BATTERY OFF	Battery switch is off.
MAIN BAT DISCH	Main battery is discharging
STANDBY BUS OFF	Standby bus is switched off
APU EGT XXX	Displays the APU turbine temperature when the APU is running
APU GEN OFF	APU generator switch is off with the APU available.
L GEN OFF	Generator is switched off with the engine running.
R GEN OFF	Generator is switched off with the engine running
APU BLEED VAL	APU bleed valve/switch disagree.
L ENG BLD OFF	Engine bleed is switched off with engine running
R ENG BLD OFF	Engine bleed is switched off with engine running
L ENG OIL PRES	Engine oil pressure is low.
R ENG OIL PRES	Engine oil pressure is low.
AUTOBRAKES	Autobrakes are disarmed.
AUTOTHROT DISC	Autothrottle disconnected.
PARKING BRAKE	Parking brake on.
L PACK OFF	Pack is switched off.
R PACK OFF	Pack is switched off
L RECIR FAN	Recirculation fan is switched off.
R RECIR FAN	Recirculation fan is switched off
L YAW DAMPER	Yaw damper switched off.
R YAW DAMPER	Yaw damper switched off.
AUTO COORD OFF	The switch controls auto coordination for FS98.
L PACK INOP	Air conditioning pack is inoperative.
R PACK INOP	Air conditioning pack is inoperative.
TRIM AIR OFF	Trim air switch is off.

CAS message control

When a message is displayed on the EICAS it can be cancelled (except warnings) by pressing the CANCEL button. This clears the messages from the EICAS. To see these messages again press RECALL and all cancelled messages are displayed again.

Sometimes there are more messages than can be displayed on the EICAS screen. In this case "RECALL PAGE 1" will be displayed. This means there are more messages on another page. To call up more pages on the EICAS press RECALL to scroll through them.

CENTER PANEL INSTRUMENTS



Another major change in this panel is the removal of the standby instruments from the main page to make room for the more useful gauges. The standby instruments are still available and are selectable by pressing the "STBY INST" toggle button. The standby instruments will pop up on top of these new center panel instruments. The reason for the departure
from the old version is that standby instruments are basically useless in FS98 and are not required to be looked at all the time. However, in this panel with the electrical system simulated it may become necessary in flight to reference the standby instruments if you set up the electrical system incorrectly. More on that in the overhead system explanation.

GPWS/Warning Lights

	FIRE	CONFIG
	PULL UP	A/P DISC
SPEED BRAKES	CABIN ALT	OVSPD
	AUTO PILOT	G/S
A/T DISC	FMC	INHIBIT

Certain warnings are annunciated on the center panel. Some in conjunction with EICAS messages. The GPWS is controlled from this panel as well.

Ground Proximity Warning System

This system provides aural warnings in the event of the following conditions: Excessive descent rate, excessive terrain closure rate, altitude loss after takeoff or go-around, and unsafe terrain clearance when not landing. Additionally, the GPWS will make altitude callouts during landing.

Control of the GPWS system involves two mouse click areas. Pressing over the PULL UP annunciator will "test" the system. A good test is shown by all of the GPWS annunciators lighting up and an aural "GLIDESLOPE WHOOP WHOOP PULL UP" sounding.

The GPWS system my be inhibited by pressing on the G/S portion of the "G/S INHIBIT" button. This will effectively turn of the GPWS system completely.

The following is a summary of system aural callouts:

TERRAIN TERRAIN	Closure rate to the ground is excessive. Warning envelope depends on configuration, airspeed, radio height and closure rate.
WHOOP WHOOP PULL UP	Close proximity to the ground which requires immediate action from the pilot. Warning envelope depends on configuration, airspeed, radio height and closure rate.
TOO LOW FLAPS	Warning envelope depends on radio altitude and airspeed.
TOO LOW GEAR	Warning envelope depends on radio altitude and airspeed.
TOO LOW TERRAIN	Too close to the ground and not in the landing configuration. Warning envelope depends on airspeed and radio height.
DON'T SINK	Sink rate after initial take-off climb or during a go-around.
SINK RATE	Excessive descent rate. If not corrected may lead to a PULL UP message.
MINIMUMS MINIMUMS	On an approach and at the radio height selected using the altimeter bug
GLIDESLOPE	Below glideslope by an unacceptable margin. Warning envelope depends on radio altitude and dots "fly up" (dots below glideslope).

Warning Annunciators

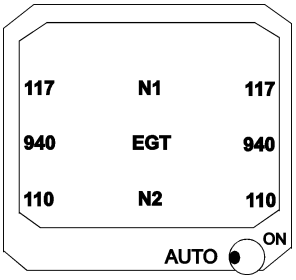
	FIRE	CONFIG
	PULL UP	A/P DISC
SPEED BRAKES	CABIN ALT	OVSPD
	AUTO PILOT	G/S
A/T DISC	FMC	INHIBIT

This is a summary of the warning annunciators and when they are activated.

CONFIG	Aircraft is not in the proper configuration for takeoff or landing (EICAS message may be present as well).
PULL UP	Whenever the GPWS system has a warning pending this light will illuminate.
A/P DISC	Anytime the autopilot is disconnected. An aural warning along with an EICAS message is also generated.
OVSP	Anytime the airspeed exceeds the Vmo pointer. Aural warning will sound as well.
SPEED BRAKES	Tells the pilot that the speed brakes are deployed.
A/T DISC	The autothrottle has been disconnected. An aural warning along with an EICAS message is also generated.
G/S INHIBIT	Pressing this will disarm the GPWS and prevent any further warnings. The G/S light will illuminate anytime the GLIDESLOPE warning is triggered.

OIL PRESSURE annunciators are located below the standby engine instrument. They will illuminate anytime the engine oil pressure is low. There is also an EICAS message as well.

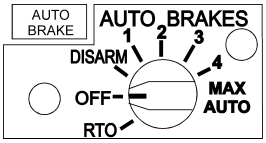
Standby Engine Gauge



The engine instruments are contained on the EICAS screens. However in case of failure (electrical or otherwise) of these screens the standby engine gauge can display critical engine data.

Normally the standby engine gauge is not visible. When the switch is in the AUTO position the display will be blank. In the AUTO position the display remains blank until there is an electrical failure and the EICAS screens are inoperative. Switching to ON will force the engine data to be displayed at all times regardless of EICAS status.

Autobrakes



Operation of the autobrake is by mouse click left or right of the knob. The following settings are available:

RTO is used for takeoff. In the event of a rejected takeoff full application of the brakes will take place until the pilot disarms the system or the autobrake automatically disarms.

OFF turns the autobrakes off.

DISARM occurs automatically when the plane slows below a certain speed depending on the situation. Anytime the autobrake is disarmed you will get an EICAS message. Also when the autobrake is automatically or manually disengaged after landing or RTO the AUTO BRAKE warning annunciator will illuminate.

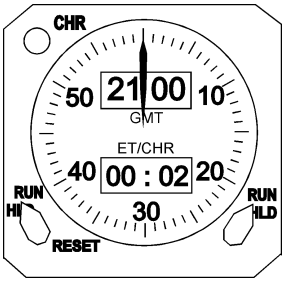
1 2 3 4 MAX: The autobrake is armed for engagement after landing. 1 is the lowest setting and will result in the least amount of automatic braking. MAX is the highest setting and results in maximum automatic application of braking after landing.

In all cases the autobrake is disengaged automatically after speed reduction is accomplished, manually via brake application by the pilot, or manually by switching the switch to OFF.

Standby Flight Instruments

The standby instruments (Airspeed, Altitude and Vertical Speed) are in a separate window that is displayed by using the STBY INST button located on the panel below the EICAS screens or by the SHFT-3 keyboard combination.

Clock



There are 3 major features of the clock: GMT time display, Elapsed timer, and chronometer.

The GMT time display shows Zulu time. It is adjustable by clicking directly on the digital display.

The elapsed timer (ET) knob when set to the HOLD (HLD) position means the elapsed timer is not running. The elapsed timer can be used to keep track of total flight time or other long term timing needs. Use the mouse click to put the ET knob to RUN which starts the elapsed timer. The secondhand does not move during operation of the ET function and the time displayed in the ET/CHR window will be hours:minutes. To reset the ET just click over the “RESET” and the ET knob will momentarily move to RESET and then spring back to HLD. This knob is spring loaded to HLD. If at anytime it is necessary to temporarily hold the elapsed timer and then restart it without resetting, just go back and forth between RUN and HLD without resetting the ET displayed. The elapsed timer is not affected by changes in the GMT or the use of the chronometer.

The chronometer is nothing more than a stopwatch. Click the CHR button to start the chronometer timing. The second hand operates to show seconds and the ET/CHR window shows minutes. To stop the timing press the CHR button again. Once the chronometer is stopped it cannot be restarted...the next click of the CHR button will reset the chronometer. Use of the chronometer is independent of the ET display. The ET runs in the background while the chronometer is running and will be displayed again once the CHR is reset

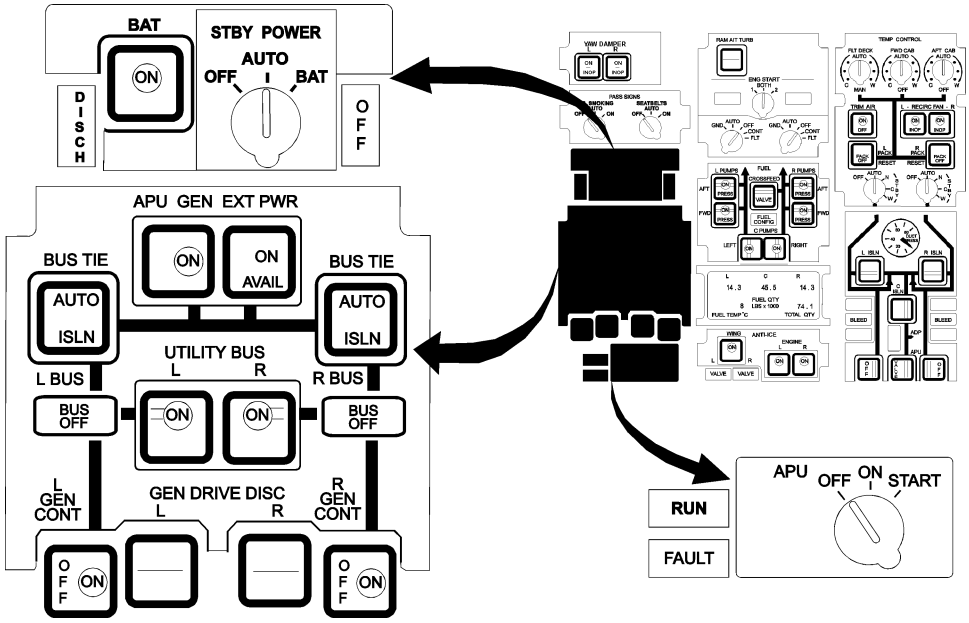
OVERHEAD SYSTEMS PANEL

The overhead is called up by pressing either Shift-4 or using the button labeled "LT OVRD" on the visible portion of the overhead.

A feature of this panel is the ability to start with a completely "cold" aircraft. This means that all of the systems and buttons are in the off position. All of the switch positions will be remembered by the panel for the next time the simulator is started.

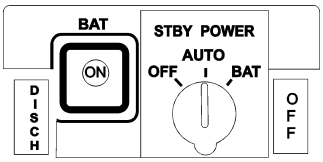
Turning on the BAT switch brings power to the overhead switches.

ELECTRICAL SYSTEMS



The heart of this aircraft's systems is the electrical system. If this panel is not set up properly then you will have all kinds of trouble with your instrumentation because all aircraft components are dependent on electrical power being available. There are 3 main power sources for this aircraft: battery power, external power, and APU generator power. EICAS messages are generated for all aspects of the electrical system.

Battery Power



The batteries are selected ON using the pushbutton under the guarded switch labeled BAT. Turning on the battery along with STBY POWER will power the overhead panel indications. There are a limited number of systems available with battery power only.

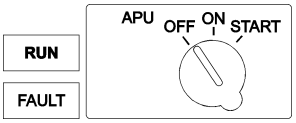
The STBY POWER switch controls power to the standby electrical bus. On the actual airplane the standby buses power very essential services. The normal position is AUTO which means the aircraft controls what power source flows to this bus. In the BAT position the battery powers these buses and it is then possible to drain the battery dead.

The battery switch must be ON in order to start the APU.

External Power

Click on the mounting screw at the top, right of the EXT PWR on the AC Bus subpanel will toggle the external power on-off. EXT PWR AVAIL light will illuminate when external power is on.

APU Power

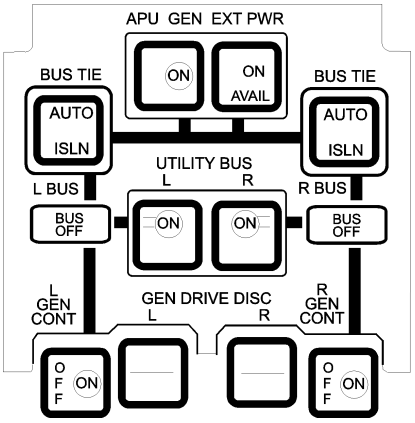


The APU is an essential component of the aircraft's electrical system. Not only will it power the aircraft with sufficient power to run all systems it will provide the bleed air required to start the engines. Without the APU you cannot start the plane <g. In real life you can hook up an external air source for starting but we did not simulate that here. So you have to start the APU for every flight if you don't want to fly a glider.

Starting the APU is straight forward. The BAT switch must be ON or the APU will not start. Then click the mouse click area around the START part of the knob to initiate the start sequence. The switch is spring loaded to the ON position so will quickly move back to ON. The FAULT light will illuminate momentarily to indicate that the APU start sequence has begun. There is an APU sound associated with the APU start up and eventual running. The RUN light illuminates to indicate availability of APU power for electrical and pneumatic systems.

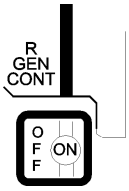
The APU GEN switch controls the application of APU power to the electrical system. The OFF light illuminates if the switch is in the OFF position with the APU running or when the switch is ON with the APU shut down. Pushing in the APU GEN switch will illuminate the flow bar and extinguish the OFF light if APU power is available.

AC BUS



There are two BUS OFF lights on the electric panel. These correspond to the left and right AC buses. These buses are not powered on BAT power only...they need a generated source of power. The most important bus on the 767 is the L AC BUS which powers the Captains instruments. The airplane does all that it can to protect power to that bus. There are isolation BUS TIE switches that control the flow of power to and from these buses. Most of the time they are controlled automatically since the BUS TIE switch is normally left in AUTO. If the L AC BUS is not powered there will be problems with the main panel.

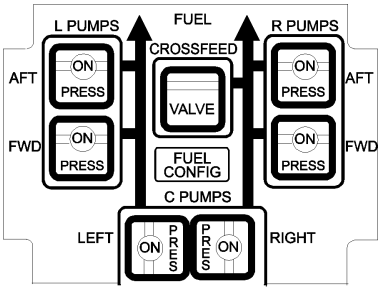
Generators



Each engine has its own electrical generator that will provide power when it's engine N2 is at the idle value. The left and right generators have three states; OFF, Online OFF and ON. With the GEN button in the OFF position only the OFF light shows. This means that the generator breaker is open and power is not applied to the airplane from this generator. In Online OFF the GEN button pushed in but the engine is shut down or below the idle value. In Online Off both the OFF and ON lights show. When the GEN button pushed in so only the ON light shows the generator breaker is closed and power is provided from this generator to the electrical system.

FUEL AND STARTING SYSTEMS

Fuel Panel



Complete fuel management is possible with the fuel panel, provided FS98 is set up to allow it. In FS98 go to the FUEL page and check "Manual fuel control" active. This allow actions with the fuel panel to properly affect the transfer of fuel.

Here is the fuel panel with all lights ON. PRESS lights in the AFT and FWD pump switches indicate that the fuel pump pressure is low and will come on when the switch is off or if the tank is out of fuel.

The center fuel pumps PRESS lights only illuminate when the pump switches are on and the center tank is out of gas. There is no warning for when the center pumps are selected OFF.

EICAS messages will be presented for each fuel configuration.

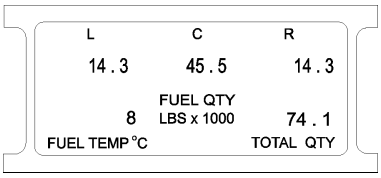
There are three tanks on the 767. The two main wing tanks and the center tank. The main wing tanks are each equipped with two fuel pumps: FWD and AFT. When only the L PUMPS, R PUMPS, AFT and FWD are on, the fuel panel is configured for fuel to be fed to the engines from the wing tanks only. No fuel will be pumped from the center tank because those pumps are OFF. If the FUEL CONFIG light is on at this setting it indicates that there is greater than 1200 pounds of fuel in the center tanks with the pumps off. If the LEFT C PUMPS AND RIGHT C PUMPS are then turned ON then there will be fuel fed to the engines from the center tank only. The center fuel pumps on this aircraft have a higher output than the main fuel pumps and will override the output of the main tank pumps. In this case the FUEL CONFIG light will be extinguished because the center pumps are on and there is more than 1200 pounds in the center tank.

The FUEL CONFIG light will illuminate for a fuel unbalance of 2000 pounds between the left and right tanks or for low fuel quantity (less than 2200 pounds) in either main tank.

Crossfeeding fuel. Fuel can be crossfeed from either main tank to feed both engines. For example, fuel pumps for the left side can be turned off and the crossfeed valve turned on. This will cause the RIGHT fuel pumps to supply fuel to BOTH engines from the right main tank only. To feed fuel from the left main tank only just reverse the process.

Important note: To start the crossfeed operation the crossfeed valve MUST first be opened before shutting down the fuel pumps. And to finish the crossfeed operation the fuel pumps MUST be turned ON before closing the crossfeed valve. Otherwise there is a risk of an engine flameout

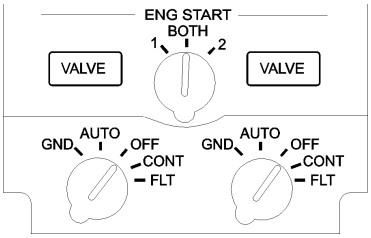
EICAS messages are displayed for various fuel problems



Fuel quantity is indicated for the Left, Center and Right fuel tanks. Additionally, there is a total fuel quantity indication as well as a fuel temperature indication.

This gauge will determine if FS98 is set for metric or US systems and display the units accordingly.

Start Panel



The main components of the engine start panel are the two start knobs. They each have five labeled positions....however only three of them active: OFF: Ignition system is OFF. AUTO: Ignition system is in automatic mode. This mode is the normal flight mode and will automatically handle the igniter functions if needed. GND: For starting the engine. The knob is magnetically held in place until 50% N2 at which time it will release to the AUTO position. Above the starter switches are two VALVE lights and another selector knob. The VALVE light comes on to indicate movement of the starter valve. This normally occurs during initial rotation and also again around 50% N2. The selector knob labeled 1, BOTH, 2 has no function.

Fuel Control SWITCHES

The fuel control switches are located under the throttle levers. Each must be set to run for engine operation.

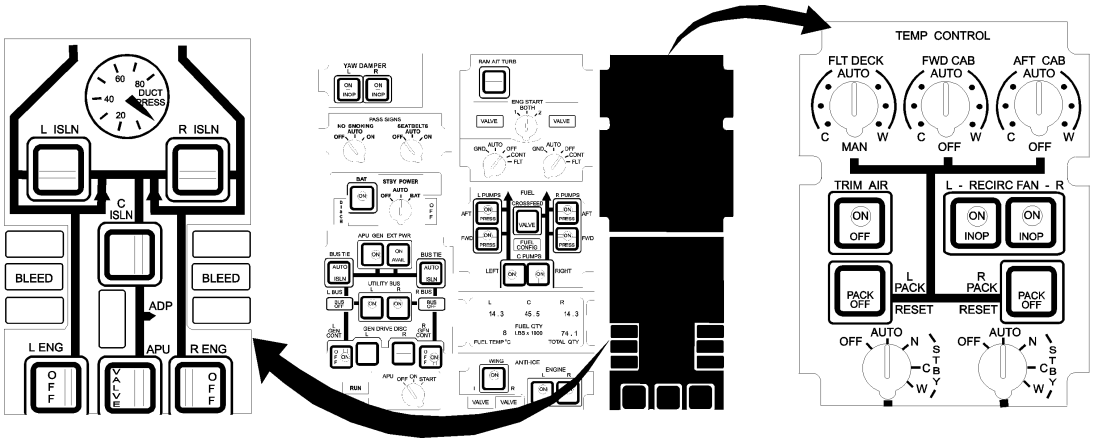
Normal Engine Starting Procedure

1. Complete Cockpit Initial check
2. Complete Cockpit Final checks
3. Complete Before Starting Engines checklist
4. Select GND on the start selector
5. At 18% N2 set the Fuel Control switch to RUN
6. At 50% N2 start selector will spring to AUTO
7. Repeat steps 4 – 6 for other engine

Quick Engine Starting Procedure

Battery – ON
Standby Power – AUTO
APU – START
L Bus Tie – AUTO
R Bus Tie – AUTO
APU Gen Sw – ON
APU Valve – Press ON
FWD/AFT Fuel L Pumps – ON
FWD/AFT Fuel R Pumps – ON
L ENG Start – GND
L Fuel Control – RUN
L GEN CONT – ON
R ENG Start – GND
R Fuel Control – RUN
R GEN CONT – ON
APU GEN Sw – OFF
APU Bleed Valve – Press OFF
APU – OFF
L ENG BLD – Press ON
R ENG BLD – Press ON
C ISLN – Press ON
L ISLN – Press ON
R ISLN – Press ON
YAW Damper – ON

PNEUMATIC SYSTEM



The most important aspect to the pneumatic system is it's involvement in engine starting. The engines on the 767 require an air source to drive the start. The source of this air can be from an external source, the APU or the other engines bleed air. External air hookup is not simulated so APU and engine bleed air are the only
two sources available in the simulator. Without an air source available and set up properly the engines will not start.

The status of the pneumatic system is completely annunciated on the EICAS panel.

Cold Startup

This assumes the aircraft is completely shut down. After powering up the aircraft from the electric panel, start the APU. Once the APU is running, bleed air is available for use on the aircraft via the APU bleed pushbutton. The VALVE light comes on to indicate availability of APU bleed air with the pushbutton off. Pressing the APU bleed pushbutton opens the APU bleed valve.

Isolation Valves

Operation of the isolation valves is important to starting the aircraft and continued operation of the pneumatic system on the ground and in flight. The following procedure assumes the APU is running.

Set APU bleed valve open (pushbutton in). If you push the APU pushbutton with the APU off the VALVE warning light will illuminate. At this point there is no DUCT PRESS (pressure). This is because the C ISLN valve is closed (pushbutton open).

Press the C ISLN valve pushbutton in. The flow bar will illuminate. However, there still is no DUCT PRESS because the L and R ISLN valves are still closed.

Press the L ISLN valve pushbutton in and note that there is now pressure in the left duct as shown by the DUCT PRESS gauge.

Press the R ISLN valve pushbutton in and note that there is now pressure in the right duct as shown by the DUCT PRESS gauge.

Important to note is that without DUCT PRESS the engines will not start. So setting up the isolation valves is important. Note that the aircraft can not fly around with the ISLN valves open all the time. There is an important reason why not. After starting the engines and before takeoff the L and R ISLN valves are normally closed (pushbutton out) for takeoff and flight. The most important reason for this is to protect the operating engine in case of engine failure. The pilot would not want the only operating engine to now have 2 times the bleed draw upon failure of the opposite engine. This could cause even more trouble.

If desired, after the start of one engine the entire pneumatic system can be operated from that engines bleed source. In this case the APU pushbutton would be pressed OFF (pushbutton out) after engine start. The appropriate L ENG or R ENG pushbutton would be pushed in after which the opposite side R ISLN or L ISLN pushbutton would be pushed in to complete the process.

Notice that the C ISLN valve remains open even with the APU bleed valve closed (pushbutton out). In the actual aircraft there are some services that run off the C ISLN duct and require the ISLN valve to be open during flight to get engine bleed air back to those areas.

Air Conditioning System

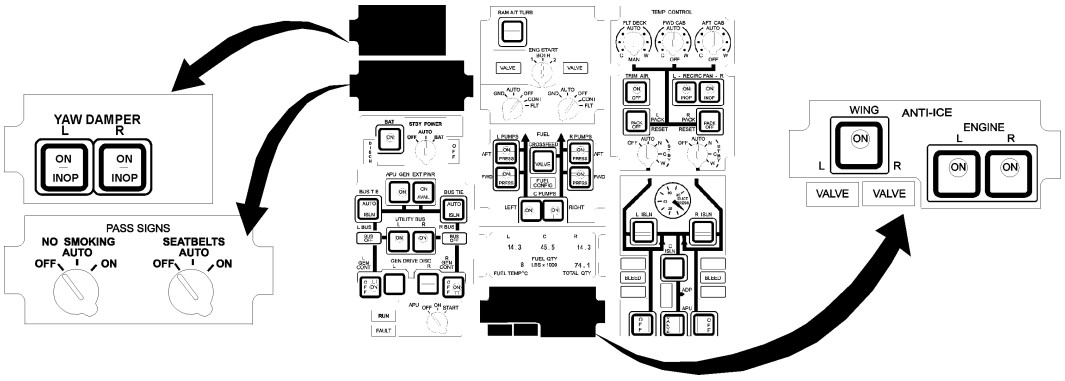
This is a non-operational system. It will affect the EICAS warning and some sounds. The RECIRC fans generate a fan noise when ON.

L and R PACK switches are air conditioning switches. A PACK is an air cycle machine that conditions the air for entry into the aircraft cabin. If the PACK is off then there is no air to the cabin even though there might be air available as indicated by DUCT PRESS. There will be an INOP warning since there is no air source available.

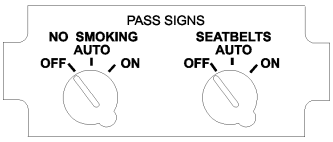
TRIM AIR is found on some aircraft and is another air source used by the air conditioning system. It has an EICAS warning.

The RECIRC FANS generate EICAS messages when not operating or are switched off. The recirc fans generate a fan noise when operating. The recirc fans will not operate on battery power only.

MISCELLANEOUS OVERHEAD SYSTEMS

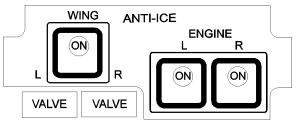


Passenger Signs



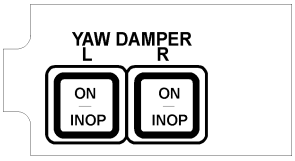
The three positions are OFF, AUTO and ON. OFF is obvious. AUTO mode will turn the signs ON and give a "ding". The AUTO mode is basically another ON mode. The ON mode is obvious.

Anti-Ice



The engine and wing anti-icing switches serve no real purpose other than to simulate these systems. They do have valve lights though. These lights will come on to indicate malfunctions or valve transit. In our case they just simulate valve transit so momentarily flash any time you select the switches on or off.

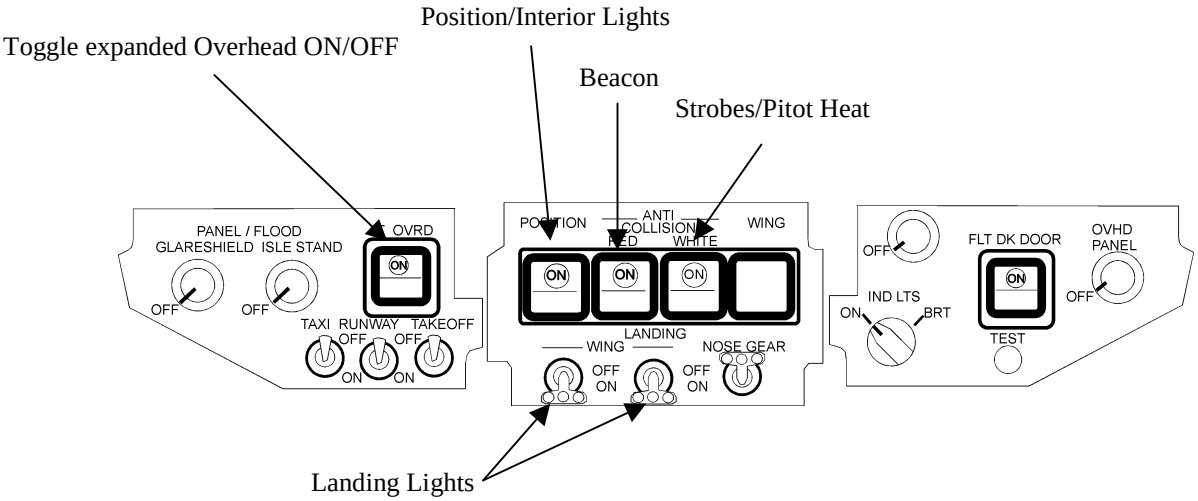
Yaw Damper



The "L" yaw damper switch controls the operation of the yaw damper. The "R" yaw damper switch controls the AUTO COORDINATION option of FS98. With the switch off (inop) the auto coordination feature is turned off. With the switch on the auto coordination feature is on. There is an appropriate EICAS message when these switches are turned off.

FORWARD OVERHEAD

This portion of the overhead contains mostly light switches and non-functioning switches.



PERFORMANCE CHARTS B-767-200

Note: The charts in this section are based on the real aircraft. The performance of Flight Sim aircraft are dependant on their AIR file and, as such, flight performance may be different than the following charts.

OPERATING SPEEDS

CONDITION	ALTITUDE	KIAS	MACH
Standard Climb Speed	10,000 Feet and Above	300	0.80
Optimal Speeds for Minimum Trip Fuel Usage	10,000 Feet and Above	290	0.78
Best Climb Rate Speed	Gross Weight (1000 Lbs)		
	320.0	292	0.78
	300.0	289	0.78
	260.0	282	0.78
	220.0	276	0.78
Best Climb Angle Speed	Gross Weight (1000 Lbs)		
	320.0	244	0.77
	300.0	234	0.77
	260.0	214	0.77
	220.0	203	0.77
Rough Air Speed	15,000 Feet and Above	290	0.78
	Below 15,000 Feet	250	---
Standard Cruise		300	0.80
Standard Descent Speed	10,000 Feet and Above	280	0.80

TWO ENGINE 300 KNOT CRUISE

FLT LEVEL		EPR NAM / 1000 LBS									
STD TEMP	IAS / TAS	GROSS WEIGHT - 1000 POUNDS 310	300	290	280	270	260	250	240	230	220
300 -44 °C	466	1.17 40.5	1.16 41.3	1.15 41.9	1.14 42.6	1.13 43.2	1.13 43.8	1.12 44.4	1.11 45.0	1.10 45.6	1.10 46.2
290 -42 °C	459	1.15 40.1	1.14 40.9	1.13 41.5	1.12 42.2	1.12 42.8	1.11 43.4	1.10 44.0	1.10 44.6	1.09 45.2	1.08 45.8
280 -40 °C	452	1.14 39.6	1.13 40.4	1.12 41.0	1.11 41.6	1.10 42.3	1.10 42.9	1.09 43.5	1.08 44.1	1.08 44.7	1.07 45.3
270 -38 °C	445	1.12 39.2	1.11 39.8	1.11 40.4	1.10 41.1	1.09 41.7	1.08 42.3	1.08 42.9	1.07 43.6	1.06 44.2	1.06 44.8
260 -36 °C	438	1.11 38.7	1.10 39.3	1.09 39.9	1.09 40.5	1.08 41.2	1.07 41.8	1.07 42.5	1.06 43.2	1.05 43.8	1.05 44.5
250 -34 °C	431	1.10 38.2	1.09 38.7	1.08 39.4	1.08 40.0	1.07 40.6	1.06 41.4	1.06 42.0	1.05 42.6	1.05 43.4	1.04 43.8
200 -24 °C	399	1.05 35.2	1.05 35.8	1.04 36.4	1.04 37.0	1.03 37.5	1.03 38.0	1.03 38.5	1.02 39.0	1.02 39.5	1.01 40.0
150 -14 °C	371	1.03 32.3	1.03 32.7	1.02 33.1	1.02 33.6	1.02 34.0	1.01 34.4	1.01 34.9	1.01 35.4	1.01 35.7	1.00 35.9
100 -4 °C	345	1.01 28.4	1.01 28.7	1.01 29.0	1.00 29.4	1.00 29.8	1.00 30.1	1.00 30.5	0.99 30.7	0.99 31.1	0.99 31.5

Adjustments:
TAS (knots) is for standard temperature. Add 1 knot/°C above standard.

Subtract 1 knot/°C below standard.

Fuel consumption (1000 pounds/hour) = (TAS for actual temperature) / (NAM / 1000 pounds)

TWO ENGINE MACH .80 CRUISE

FLT LEVEL		EPR NAM / 1000 LBS									
STD TEMP	TAS	GROSS WEIGHT - 1000 POUNDS 310	300	290	280	270	260	250	240	230	220
430 -57 °C	224 459								1.46 51.8	1.42 54.5	1.37 57.3
420 -57 °C	232 459						1.51 47.5	1.45 50.1	1.41 52.5	1.37 55.0	1.33 57.4
410 -57 °C	237 459					1.48 46.1	1.44 48.4	1.40 50.7	1.36 53.0	1.32 55.1	1.29 57.1
400 -57 °C	242 459				1.47 44.9	1.43 47.0	1.39 49.1	1.35 51.1	1.32 53.1	1.29 54.9	1.26 56.6
390 -57 °C	248 459		1.50 41.7	1.45 43.7	1.41 45.6	1.38 47.5	1.34 49.4	1.31 51.2	1.28 52.9	1.26 54.5	1.24 56.0
380 -57 °C	254 459	1.47 40.8	1.43 42.6	1.40 44.3	1.36 46.1	1.33 47.8	1.30 49.4	1.28 50.9	1.26 52.4	1.24 53.8	1.22 55.1
370 -57 °C	260 459	1.41 41.5	1.38 43.2	1.35 44.8	1.32 46.3	1.29 47.8	1.27 49.1	1.25 50.5	1.22 51.7	1.20 52.9	1.20 53.9
360 -57 °C	266 459	1.36 42.1	1.33 43.5	1.30 44.9	1.28 46.2	1.26 47.4	1.24 48.6	1.23 49.8	1.21 50.8	1.20 51.7	1.19 52.7
350 -54 °C	272 461	1.32 42.2	1.29 43.5	1.27 44.6	1.25 45.8	1.24 46.8	1.22 47.9	1.21 48.8	1.19 49.7	1.18 50.5	1.17 51.4
340 -52 °C	278 463	1.28 42.1	1.26 43.2	1.25 44.2	1.23 45.2	1.21 46.1	1.20 46.9	1.19 47.7	1.18 48.5	1.17 49.3	1.15 50.1
330 -50 °C	284 465	1.25 41.8	1.24 42.7	1.22 43.5	1.21 44.4	1.20 45.1	1.19 45.8	1.18 46.6	1.17 47.3	1.16 48.0	1.15 48.7
320 -48 °C	291 467	1.23 41.2	1.22 42.0	1.20 42.7	1.19 43.4	1.18 44.1	1.17 44.7	1.17 45.4	1.16 46.0	1.15 46.7	1.14 47.3
310 -46 °C	297 469	1.21 40.5	1.20 41.1	1.19 41.7	1.18 42.4	1.17 43.0	1.16 43.6	1.15 44.1	1.15 44.7	1.14 45.4	1.13 46.0
300 -44 °C	304 471	1.19 39.6	1.18 40.2	1.17 40.7	1.17 41.3	1.16 41.8	1.15 42.4	1.14 42.9	1.14 43.5	1.13 44.1	1.12 44.6

When operating in gray region, determine and set max cruise EPR is less than listed value.

Adjustments:
TAS (knots) is for standard temperature. Add 1 knot/°C above standard.

Subtract 1 knot/°C below standard.

Fuel consumption (1000 pounds/hour) = (TAS for actual temperature) / (NAM / 1000 pounds)

TWO ENGINE LONG RANGE CRUISE

	EPR
	MACH
FLT	TAS
LEVEL	NAM / 1000 LBS

When operating in gray regions, determine and set max cruise EPR is less than listed value.

STD TEMP	GROSS WEIGHT - 1000 POUNDS 310	300	290	280	270	260	250	240	230	220	210
430 -57 °C								1.46 .798 458 5.20	1.42 .800 459 54.5	1.38 .801 459 57.1	1.34 .802 460 59.8
420 -57 °C						1.51 .796 456 47.6	1.45 .798 458 50.2	1.41 .800 459 52.5	1.37 .801 459 54.9	1.33 .800 460 57.3	1.30 .800 459 59.2
410 -57 °C					1.48 .797 457 46.3	1.44 .799 458 48.5	1.40 .800 459 50.7	1.36 .801 459 52.8	1.33 .802 460 55.0	1.29 .800 459 57.1	1.26 .797 457 59.2
400 -57 °C			1.53 .795 456 42.8	1.46 .798 457 45.0	1.43 .799 458 46.9	1.39 .800 459 49.0	1.35 .801 460 51.1	1.32 .801 460 53.0	1.29 .800 459 54.9	1.26 .797 457 56.9	1.23 .791 454 58.9
390 -57 °C		1.49 .796 457 41.9	1.45 .798 458 43.8	1.41 .800 459 45.6	1.38 .801 459 47.5	1.34 .802 460 49.3	1.31 .801 459 51.0	1.28 .800 459 52.9	1.26 .796 457 54.8	1.23 .791 454 56.7	1.21 .784 450 58.3
380 -57 °C	1.47 .797 547 40.9	1.43 .799 458 42.6	1.40 .800 459 44.3	1.36 .801 459 46.0	1.33 .802 460 47.7	1.30 .801 459 49.3	1.28 .799 458 50.9	1.25 .796 .456 52.7	1.23 .791 453 54.4	1.21 .784 450 56.0	1.19 .776 445 57.4
370 -57 °C	1.41 .799 458 41.5	1.38 .800 459 43.1	1.35 .801 459 44.6	1.32 .802 460 46.2	1.29 .801 459 47.7	1.27 .799 458 49.2	1.24 .795 456 50.8	1.22 .790 453 52.4	1.20 .784 449 53.7	1.19 .776 445 55.2	1.17 .766 439 56.7
360 -56 °C	1.36 .801 459 42.0	1.33 .802 460 43.4	1.31 .801 460 44.8	1.28 .800 459 46.1	1.26 .798 458 47.6	1.24 .794 455 49.0	1.22 .789 453 50.5	1.20 .783 449 51.8	1.18 .775 445 53.2	1.17 .766 439 54.6	1.15 .755 433 56.0

350 -54 °C	1.32 .802 462 42.2	1.29 .801 462 43.5	1.27 .799 461 44.7	1.25 .797 459 46.0	1.23 .793 457 47.3	1.21 .788 454 48.6	1.19 .781 450 49.7	1.18 .774 446 51.5	1.16 .765 441 52.5	1.15 .755 435 53.8	1.13 .744 429 55.2
340 -52 °C	1.28 .800 463 42.1	1.26 .799 462 43.2	1.24 .795 460 44.4	1.22 .791 458 45.7	1.20 .786 455 46.8	1.19 .780 452 48.0	1.18 .773 447 49.1	1.16 .764 442 50.4	1.15 .754 437 51.7	1.13 .744 431 53.0	1.12 .732 424 54.4
330 -50 °C	1.25 .797 464 42.0	1.23 .794 462 43.0	1.21 .790 459 44.1	1.20 .785 456 45.1	1.19 .778 453 46.2	1.17 .771 448 47.3	1.16 .763 444 48.5	1.14 .753 438 49.6	1.13 .743 432 50.9	1.12 .732 426 59.2	1.11 720 419 53.6
320 -48 °C	1.22 .792 463 41.7	1.21 .788 460 42.6	1.19 .783 457 43.5	1.18 .776 453 44.5	1.17 .769 449 45.5	1.15 .761 445 46.7	1.14 .752 439 47.7	1.13 .742 433 48.9	1.12 .732 427 50.1	1.11 .720 421 51.4	1.10 .707 413 52.6
310 -46 °C	1.20 .786 461 41.2	1.19 .781 458 42.0	1.22 .764 448 42.9	1.21 .755 443 43.9	1.20 .745 437 44.9	1.18 .735 431 46.0	1.17 .724 425 47.1	1.16 .711 418 48.2	1.15 .699 410 49.3	1.14 .685 402 50.5	1.13 .671 394 51.7
300 -44 °C	1.18 .778 459 40.6	1.17 .772 455 41.4	1.16 .752 443 42.4	1.14 .743 438 43.3	1.13 .733 432 44.3	1.12 .722 425 45.4	1.11 .710 418 46.4	1.10 .698 411 47.4	1.09 .685 404 48.5	1.08 .671 396 49.6	1.07 .657 387 50.8
290 -43 °C	1.16 .770 455 40.0	1.15 .762 451 40.9	1.14 .755 447 41.8	1.13 .746 442 42.8	1.12 .737 436 43.6	1.11 .728 431 44.7	1.10 .718 425 45.7	1.09 .706 418 46.6	1.08 .694 411 47.7	1.07 .682 403 48.8	1.07 .669 396 50.0
280 -41 °C	1.15 .760 451 39.5	1.14 .752 447 40.3	1.12 .744 442 41.2	1.12 .735 437 42.1	1.11 .726 431 42.9	1.10 .716 425 43.9	1.09 .705 419 44.8	1.08 .693 412 45.8	1.07 .681 405 46.9	1.07 .670 398 48.0	1.06 .658 391 49.1
270 -39 °C	1.13 .749 447 39.0	1.12 .741 442 39.7	1.11 .733 437 40.5	1.10 .724 432 41.4	1.10 .714 426 42.3	1.09 .704 420 43.2	1.08 .692 413 44.1	1.07 .681 406 45.1	1.06 .670 400 46.2	1.06 .658 393 46.2	1.05 .647 386 48.3
260 -37 °C	1.12 .738 443 38.5	1.11 .730 438 39.2	1.10 .721 432 40.0	1.09 .712 427 40.8	1.08 .702 421 41.7	1.08 .691 414 42.5	1.07 .680 408 43.5	1.06 .669 401 44.4	1.06 .658 395 45.4	1.05 .647 388 46.3	1.05 .635 381 47.4
250 -35 °C	1.10 .727 438 37.9	1.10 .719 433 38.6	1.09 .710 427 39.3	1.08 .700 421 40.2	1.07 .689 415 41.0	1.07 .679 408 41.8	1.06 .668 402 42.7	1.06 658 396 43.6	1.05 .647 390 44.5	1.04 .636 383 45.5	1.04 .624 375 46.3

240 -33 °C	1.09 .716 433 37.3	1.09 .707 427 38.0	1.08 .697 421 38.7	1.07 .687 415 39.5	1.07 .677 409 40.3	1.06 .667 403 41.1	1.05 .657 397 41.9	1.05 .647 391 42.8	1.04 .636 384 43.6	1.04 .625 378 44.6	1.03 .613 370 45.5
230 -31 °C	1.08 .704 427 36.7	1.08 .695 407 37.3	1.07 .685 401 38.1	1.06 .675 395 38.9	1.06 .666 389 39.6	1.05 .656 382 40.3	1.05 .647 376 41.1	1.04 .636 369 42.0	1.04 .625 360 42.8	1.03 .614 352 43.7	1.03 .602 347 44.6
220 -29 °C	1.07 .692 421 36.1	1.07 .683 416 36.8	1.06 .673 410 37.4	1.06 .664 405 38.1	1.05 .655 399 38.8	1.05 .646 393 39.5	1.04 .636 387 40.3	1.04 .625 381 41.2	1.03 .614 374 42.0	1.03 .603 367 42.9	1.02 .591 360 43.9
210 -27 °C	1.07 .680 416 35.5	1.06 .671 411 36.1	1.05 .662 405 36.7	1.05 .654 400 37.4	1.05 .644 394 38.1	1.04 .635 388 38.8	1.04 .625 382 39.6	1.03 .614 376 40.5	1.03 .603 369 41.3	1.03 .592 362 42.1	1.02 .580 355 43.0
190 -23 °C	1.05 .658 406 34.3	1.05 .650 401 34.9	1.04 .641 395 35.5	1.04 .632 390 36.2	1.03 .623 384 36.8	1.03 .613 378 37.5	1.03 .603 372 38.2	1.02 .592 365 39.0	1.02 .581 358 39.7	1.02 .570 351 40.3	1.02 .558 344 41.1
180 -21 °C	1.04 .648 401 33.7	1.04 .639 396 34.3	1.04 .631 390 34.9	1.03 .622 385 35.6	1.03 .612 379 36.2	1.03 .603 373 36.9	1.02 .592 367 37.6	1.02 .582 360 38.2	1.02 .571 353 38.8	1.01 .559 346 39.4	1.01 .547 339 40.2
160 -17 °C	1.03 .627 391 32.6	1.03 .618 386 33.1	1.03 .610 380 33.6	1.03 .601 375 34.3	1.02 .591 369 34.9	1.02 .581 363 35.5	1.02 .571 356 36.0	1.01 .561 350 36.7	1.01 .550 343 37.4	1.01 .538 336 37.9	1.01 .526 328 38.6
140 -13 °C	1.03 .606 381 31.2	1.02 .598 376 31.8	1.02 .589 370 32.2	1.02 .580 364 32.8	1.02 .570 358 33.3	1.01 .560 352 33.9	1.01 .550 346 34.4	1.01 .540 339 34.9	1.01 .528 332 35.5	1.00 .517 325 36.2	1.00 .504 317 36.8
120 -9 °C	1.02 .585 371 29.7	1.02 .577 365 30.2	1.01 .568 360 30.7	1.01 .559 354 31.1	1.01 .550 348 31.6	1.01 .540 342 32.1	1.01 .529 335 32.6	1.00 .519 328 33.1	1.00 .507 321 33.7	1.00 .496 314 34.3	1.00 .484 306 35.0
100 -5 °C	1.01 .565 361 28.4	1.01 .557 355 28.7	1.01 .548 350 29.2	1.01 .539 344 29.7	1.01 .529 338 30.1	1.00 .519 331 30.5	1.00 .509 325 31.1	1.00 .498 318 31.6	1.00 .487 311 32.2	1.00 .475 303 32.8	1.00 .463 396 33.5

Adjustments:
TAS (knots) is for standard temperature. Add 1 knot/°C above standard.

TWO ENGINE HOLDING SPEEDS AND FUEL FLOW

PRESS ALT		GROSS WEIGHT 1000 POUNDS								
		310	290	270	260	250	240	230	220	210
40000	EPR KIAS LBS/HR		1.51 225 10160	1.42 218 9100	1.38 214 8600	1.34 210 8160	1.31 207 7820	1.29 205 7500	1.26 202 7200	1.23 200 6860
35000	EPR KIAS LBS/HR	1.32 232 9920	1.28 224 9180	1.25 216 8500	1.23 213 82000	1.22 210 7880	1.23 207 7560	1.18 205 7220	1.16 202 6880	1.15 200 6580
30000	EPR KIAS LBS/HR	1.22 229 9700	1.19 221 9020	1.16 216 8400	1.15 213 8080	1.14 210 7760	1.13 207 7460	1.12 205 7160	1.11 202 6860	1.10 200 6580
25000	EPR KIAS LBS/HR	1.14 227 9700	1.13 221 9060	1.11 216 8440	1.10 213 8140	1.09 210 7820	1.09 207 7520	1.08 205 7220	1.07 202 6920	1.06 200 6640
20000	EPR KIAS LBS/HR	1.10 226 9680	1.08 221 9060	1.07 216 8480	1.07 213 8200	1.06 210 7920	1.06 207 7640	1.05 205 7360	1.05 202 7080	1.04 200 6820
15000	EPR KIAS LBS/HR	1.07 225 9800	1.06 221 9620	1.05 216 8660	1.05 213 8380	1.04 210 8120	1.04 207 7840	1.03 205 7560	1.03 202 7280	1.03 200 7020
10000	EPR KIAS LBS/HR	1.05 225 10200	1.04 221 9580	1.03 216 8980	1.03 213 8680	1.03 210 8400	1.03 207 8100	1.02 205 7840	1.02 202 7560	1.02 200 7300
5000	EPR KIAS LBS/HR	1.03 225 10460	1.03 221 9840	1.02 216 9240	1.02 213 8940	1.02 210 8360	1.02 207 8360	1.01 205 8080	1.01 202 7800	1.01 200 7520
1500	EPR KIAS LBS/HR	1.03 225 10620	1.02 221 10000	1.02 216 9380	1.01 213 9080	1.01 210 8780	1.01 207 8500	1.01 205 8220	1.01 202 7940	1.01 200 7680

Total fuel flow is based on holding in a race track pattern with flaps and gear retracted.

Reduce fuel flow values by 5% for holding in straight and level flight.

NORMAL CHECKLIST B-767-200

COCKPIT INITIAL PREPARATION

BATTERY SWITCH.....ON GUARDED
STANDBY POWER SELECTOR. ..... AUTO
GEAR HANDLE.....DOWN AND IN
FLAP HANDLE/INDICATOR..... AGREE
APU..... START
APU POWER/EXTERNAL POWER..... ESTABLISH
PNEUMATICS AND AIR COND..... ESTABLISH
EXTERIOR LIGHTS..... CHECK
TRANSPONDER..... SET
PARKING BRAKE..... SET

COCKPIT FINAL PREPARATION

YAW DAMPER SWITCHES..... AS REQ
CAUTION ANNUNCIATOR PANEL..... CHECK
STANDBY POWER..... TEST/AUTO
ENGINE START PANEL..... SET/CHECK
FUEL PANEL..... CHECK
WING ANTI-ICE SWITCH..... BLANK
ENGINE ANTI-ICE SWITCHES..... BLANK
NO SMOKING SIGNS..... ON
FASTEN SEAT BELT SIGNS..... CHECK
CAUTION AND WARNINGS..... CHECK
STANDBY ENGINE INDICATOR..... AUTO
AUTO BRAKES SELECTOR..... OFF
ENGINE OIL QUANTITY..... CHECK
EICAS/ENGINE DISPLAY..... CHECK
SPOILER HANDLE..... DOWN
THROTTLES..... CHECK
STABILIZER TRIM..... SET/CHECK
FUEL CONTROL SWITCHES..... CUTOFF
FUEL PANEL, QTY, DISTRIB..... SET/CHECK

BEFORE STARTING ENGINES

RUDDER PEDALS AND SEAT.. ADJUSTED/LOCKED
FUEL PANEL/QUANTITY..... SET/LBS AND CHECK
NO SMOKING SIGNS..... CHECK ON
AFDS PANEL..... SET AND CHECK
FLT INSTR SWITCHES AND BUGS. SET AND CHECK
EICAS STATUS..... CHECK
GEAR HANDLE AND LIGHTS ... DOWN AND GREEN
FLAPS..... UP
THROTTLES..... CLOSED
FUEL CONTROL SWITCHES.. CUTOFF
SPOILER HANDLE..... DOWN
BRAKES..... PARKED
NAV RADIOS/TRNSP..... SET

BEFORE BRAKE RELEASE

SEAT BELT SIGNS..... ON
FUEL PUMPS..... ON
RED ANTI-COLLISION LIGHTS. ON
PACKS..... OFF

TAXI

LEFT AND RIGHT ISLN VALVES.....CLOSED
PACKS..... ON
ENGINE ANTI-ICE..... AS REQUIRED
APU..... AS REQUIRED
FLAPS..... DOWN
FLIGHT CONTROLS..... CHECKED
EICAS DISPLAY..... RECALL/CHECK
FUEL PANEL..... CHECK

BEFORE TAKE-OFF

T.O. DATA AND BUGS..... REVIEWED
AFDS/RADIOS..... SET
STAB TRIM..... SET
FLAPS..... SET
EICAS..... RECALL/CANCEL
ANTI-ICE..... AS REQUIRED
PACKS..... AS REQUIRED
AUTO BRAKE SELECTOR.... RTO
LANDING LIGHTS..... ON

AFTER TAKE-OFF

GEAR..... NO LIGHTS AND OFF
AUTO BRAKE SELECTOR.... CHECK OFF
WHITE ANTI-COLLISION LIGHTS.....ON
PACKS..... ON
FLAPS..... UP
NO SMOKING SIGNS..... AS REQUIRED

18,000 FEET MSL.
ALTIMETERS..... RESET AND CHECKED
LANDING LIGHTS..... CHECK OFF

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DESCENT

FUEL PANEL/CROSSFEED..... AS REQUIRED
ENGINE AND WING ANTI-ICE. AS REQUIRED
LANDING DATA..... REVIEWED

DESCENDING THRU FL180 OR LEAVING CRUISE

ALTIMETERS.....RESET AND CHECKED
LANDING LIGHTS..... ON

BEFORE LANDING

ALTIMETERS..... SET
AFDS/RADIOS..... SET
FLT INSTR & BUGS..... SET
SEAT BELT/NO SMOKE..... ON
EICAS..... RECALL/CANCEL
GEAR..... DOWN
AUTO BRAKE SELECTOR.... AS REQUIRED
SPOILERS..... ..... DOWN/ARM
FLAPS..... SET

AFTER LANDING

AUTOPILOTS/AUTOTHROTTLE..... OFF
WHITE ANTI-COLLISION LIGHTS..... OFF
FLAPS..... UP
SPOILER HANDLE..... DOWN
LANDING LIGHTS..... OFF
APU..... AS REQUIRED

PARKING

BRAKES..... PARKED
SEAT BELT SIGNS..... OFF
APU OR EXTERNAL POWER. ESTABLISHED
LEFT AND RIGHT ISLN VALVES...OPEN
FUEL CONTROL SWITCHES..... CUTOFF
RED ANTI-COLLISION LIGHTS. OFF/AS REQUIRED
AUTO BRAKE SELECTOR..... OFF
FUEL PUMPS..... OFF
WING ANTI-ICE..... OFF
ENGINE ANTI-ICE..... OFF
PACKS..... AS REQUIRED
RECIRCULATION FANS..... AS REQUIRED

IF LEAVING AIRCRAFT

APU..... AS REQUIRED
STANDBY POWER..... AS REQUIRED
BATTERY SWITCH..... ON
-IF NO EXT OR APU PWR..... OFF

OPERATING LIMITATIONS B-767-200

STRUCTURAL WEIGHT LIMITATIONS

TYPE	LIMIT
Taxi	322,000
Takeoff	320,000
Landing	272,000
Maximum Zero Fuel	250,000
Minimum In-flight	168,000*

* Does not include usable fuel

MAXIMUM TIRE SPEED

Maximum tire speed: 196 knots ground speed

OVERWEIGHT LANDING

During an approach and landing at weights greater than the structural design landing weight with normal landing flaps, avoid bank angles greater than 30°.

MAXIMUM OPERATING LIMIT SPEEDS (V_{MO}/M_{MO})

The maximum operating limit speed (V_{MO} pointer/overspeed warning) shall not be deliberately exceeded in any regime of flight.

PRESS ALT (FT)	SL	5,000	10,000	15,000	20,000	27,500	30,000	35,000	42,000
V_{MO} (KIAS)	360	360	360	360	360	360 (.86M)	331 (.86M)	295 (.86M)	245 (.86M)

DESIGN MANEUVERING SPEEDS (V_A)

The maximum speed at which application of full available aileron, rudder, or elevator will not overstress the airplane.

PRESSURE ALT (FT)	SL	10,000	20,000	30,000	36,000
V_A (KIAS)	260	263	270	279	288 (.86M)

MAXIMUM FLAP EXTENDED SPEEDS (V_{FE})

FLAP POSITION	1	5	15	20	25	30
V_{FE} (KIAS)	240	220	210	195	190	162

LANDING GEAR LIMIT SPEEDS ($V_{LO/LE}$)

Operating (V_{LO})	Normal System	Alternate System
Retraction	270 KIAS	
Extension	270 KIAS/.82M	250 KIAS/.75M
Extended (V_{LE})	270 KIAS/.82M	

STALL SPEEDS - KIAS

		GROSS WEIGHT - 1000 POUNDS						
FLAP POSITION	GEAR	200	220	240	260	280	300	320
0	UP	121	128	136	143	150	157	163
1	UP	102	108	113	118	123	127	132
5	UP	98	104	108	113	120	122	126
15	UP	93	98	103	108	113	117	122
20	UP	91	96	101	106	111	115	119
25	DOWN	93	97	102	106	110	--	--
30	DOWN	90	94	98	102	107	--	--

MINIMUM V_1 SPEED (All Takeoff Flaps)

Minimum V_1 is the minimum speed on the ground at which the takeoff can be continued, utilizing aerodynamic controls alone, when the critical engine suddenly becomes inoperative with the remaining engine at takeoff thrust.

PRESSAIRPORT TEMPERATURE °F (°C)

ALT FEET	UP TO 50 (10)	60 (15)	70 (21)	80 (27)	90 (32)	100 (39)	110 (43)	120 (49)	130 (54)
8000	105	105	103	102	100	98	95	93	91
6000	108	108	107	106	104	102	99	97	95
4000	110	110	110	109	107	105	103	101	98
2000	113	113	113	113	110	109	106	104	101
SL	114	114	114	114	114	112	110	107	104