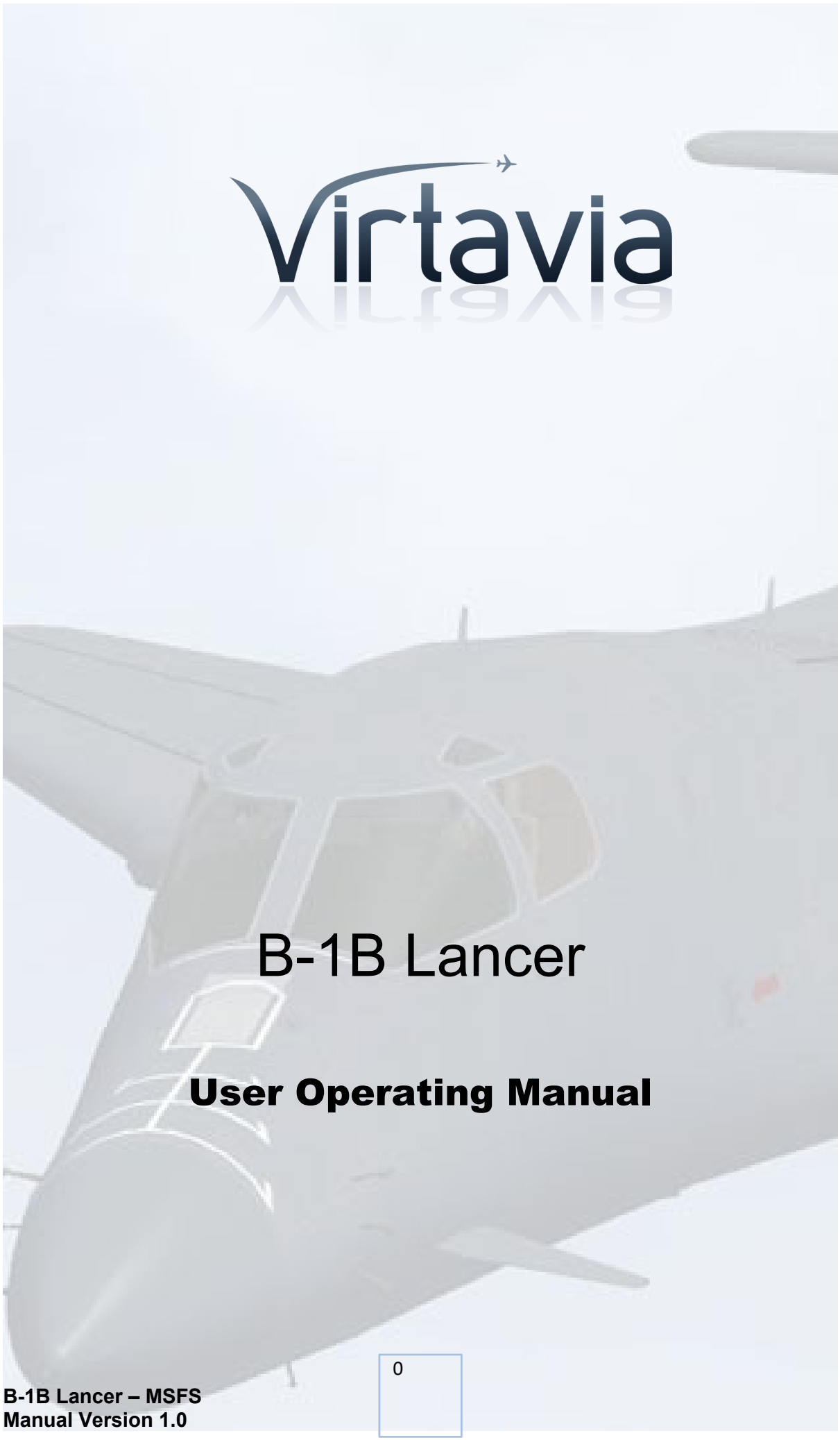


B-1B Lancer

User Operating Manual

Introduction

The Rockwell B-1B "Lancer", affectionately known as the "Bone" to its crews, is a key element of the American Strategic Long Range bomber fleet.

A development of the cancelled B-1A, the aircraft - while not technically stealth capable - still presents a fraction of the radar profile of the B-52 and incorporates extremely advanced navigation, weapons and avionics systems.

Its swing-wing technology, combined with four 30,000-lb thrust turbofan engines, creates a beautiful, fast and lethal package. The development of this successor to the B-52 began in the early 1960s and resulted in a contract being awarded to Rockwell in 1970. The B-1A first flew in 1974 but soon ran into political trouble.

The project was cancelled in 1977 when only 3 prototypes existed. However 1981 saw Ronald Reagan order a fleet of 100 B-1Bs, the last of which were delivered in May 1988. Designed for low-level, high-speed penetration, the B-1B saw action in the Kosovo conflict and second Gulf War.

Support

Should you experience difficulties or require extra information about the Virtavia B-1B Lancer, please e-mail our technical support on tech.support@virtavia.com

Copyright Information

Installation

Installation of this model will be carried out automatically by the vendor's system where the model was purchased.

Aircraft Manual

The User Manual and Checklist in PDF format can be found in the B-1B's folder in :

\SteamLibrary\steamapps\common\MicrosoftFlightSimulator\Packages\Community\vtva-b1b-lancer\SimObjects\Airplanes\Virtavia_B-1B_Lancer\documentation\

If you experience any difficulties with this model, please e-mail tech.support@virtavia.com

Exterior Model

The exterior model has all the usual animations such as landing gear, elevators etc as well as some custom ones :

3-position animated swing wing with leading edge slats. The take-off wing/flaps/slats setting is set automatically on load-in when a runway is selected when creating the flight in MSFS. Uses flap key variable.

Animated spoilerons and elevons (automatic, on stick left/right).

Wing spoilers (/-key).

Opening cockpit hatch (switch on pilot's panel).

Opening bomb bays (pushbutton on pilot's panel or ctrl-h key press).

Togglable crew figures (pushbutton on pilot's panel).

Exterior Lighting

Pressing the L key will turn on all lights, you may however wish to turn them on using the appropriate switches in the cockpit, as the L key also puts all lights on simultaneously.

Shift-L will toggle the nav lights and the cockpit lights.

Crtl-L will toggle the landing lights.

Please refer to the cockpit section of this manual for information regarding light switch location.

Interior Lighting

The interior is lit by red flood lighting. The text and instruments are on the same circuit as the interior lighting, so both general and text/gauge illumination are controlled by the same panel light on/off switch on the overhead console, next to the Navigation and Strobe lights switches (refer to the Overhead Console section further on in this manual).

The red flood is distributed onto the left side, center and right side consoles. There are three separate dimmer switches for left, center and right red flood and text lighting. These are located at the front end of the overhead console, pilot's side.

Daytime Operation

When loading the aircraft on a runway, ready for take-off, the dimmers are put by default to the DAYTIME settings :

LEFT : 20%

CENTER : 100%

RIGHT : 20%

The center dimmer must be at 100% (or near) to provide illumination to many of the instruments, as these are legacy 2D-type gauges and require some backlighting, even in daylight.

Night Operation

As mentioned above, when loading the aircraft on a runway, ready for take-off, the dimmers are put by default to the DAY position. The left and right settings of 20% will be sufficient, however the Center Dimmer will be much TOO BRIGHT at 100%. This should be re-set as shown below :

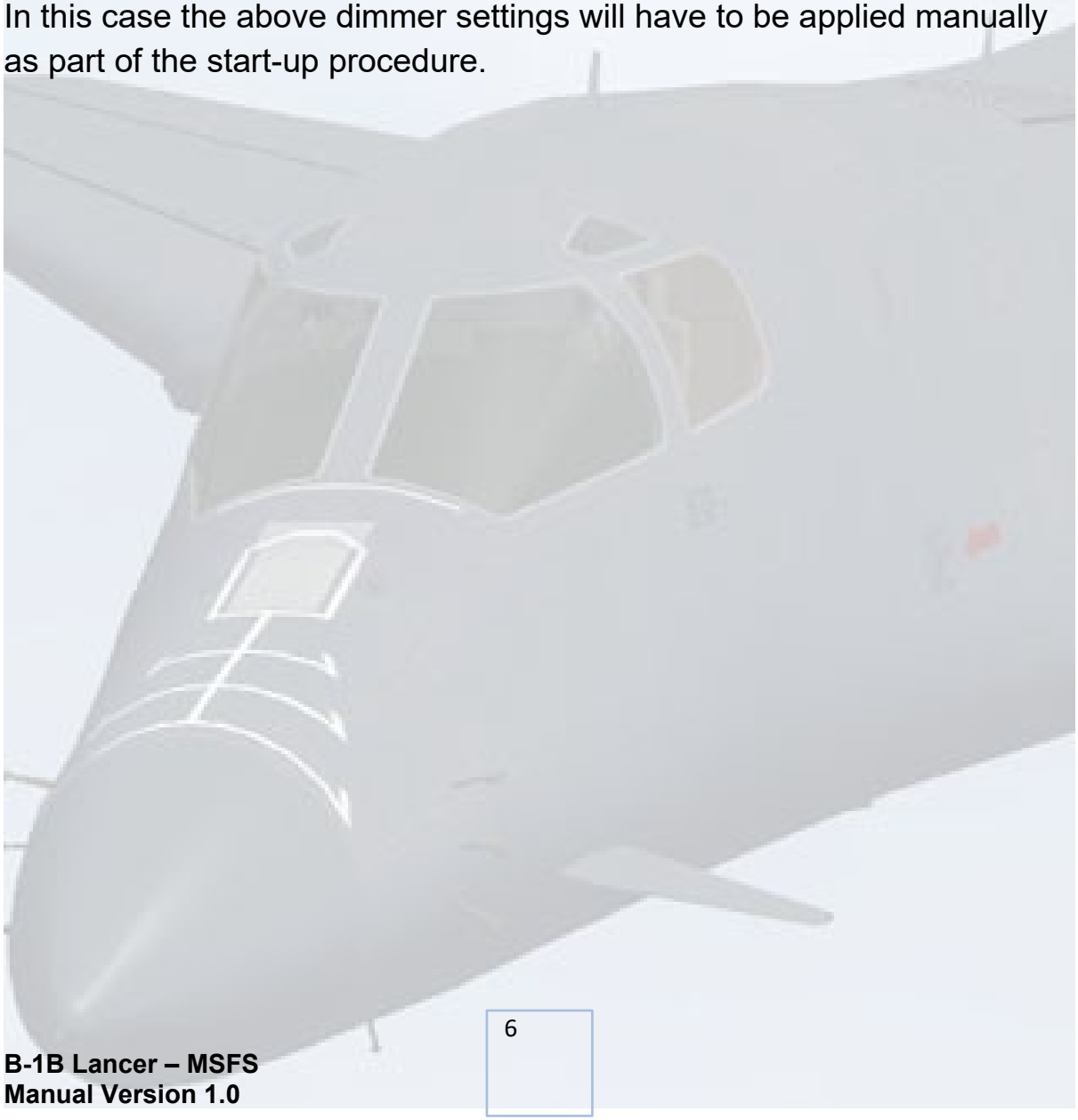
LEFT : 20%

CENTER : **20%**

RIGHT : 20%

NOTE: If the B-1B has been loaded in Parking Area, it will be in the 'cold and dark' state and all 3 dimmers will be at ZERO percent, so there will be no illumination of the cockpit, even when the panel light switch is ON.

In this case the above dimmer settings will have to be applied manually as part of the start-up procedure.



Virtual Cockpit Functions

Main Panel

1. Autopilot controls
2. Total Temperature Gauge
3. Speed, AoA Gauge
4. Weapons visibility toggle
5. Crew visibility toggle
6. Visual Situation Display
7. Radar Altimeter
8. Altitude, Vert. Spd. Gauge
9. Horizontal Situation Ind.
10. Standby Analogue Gauges
11. Surfaces Position Indicator
12. Bomb Bay Doors Switch

Autopilot

Automatic Flight Control System (AFCS)

Autopilot functions are engaged by pushing the switch-light buttons on the Automatic Flight Control System panels located beneath the outer cowling of both the pilot and co-pilot. When power is ON, the buttons display white, this is the STANDBY state. When a function is engaged by clicking on a button, the white area will go off and the green ACTIVE area will illuminate.

CMD - Command Mode

This button would normally swap autopilot control over to the other pilot. It is operable but has no function in this simulation. The autopilot in this simulation can be operated equally from both sides.

ENG - Engage Mode

This is the autopilot master switch. Selecting it engages wing and pitch levelling, the ALT Hold button will also become active.

ALT - Altitude Hold Mode

When Altitude Hold Mode is selected the system maintains the current EXISTING altitude. Therefore setting up an altitude prior to take-off is not possible. The selected altitude can then be adjusted after take-off by using the Vertical Speed Set Switch (see VS Hold Mode below), located below the Altitude Indicator to the right of the VSD. Once the desired altitude has been reached, simply press the ALT button and VS mode will be de-activated and the aircraft will level off and hold the new altitude.

HDG - Heading Hold Mode

When selected the system will adjust the aircraft heading to whatever is is set on the Horizontal Situation Indicator (HSI) gauge below the VSD. Adjustments to the HDG value can be made using the knob in the lower left corner on the HSI. A heading bug rotates around the compass ring on the HSI to show the current HDG value. The knob tooltip also shows the value - left-click to select and use the mousewheel to adjust the HDG value. See the section on the HSI below for more information and close-up images.

SPD - Airspeed Hold Mode

When selected the system maintains the current existing airspeed. The SPD value can be adjusted by using the Speed Set Switch, located below the Speed Indicator to the left of the VSD, this is a small gray rectangular switch. Click and drag the switch up or down to set an airspeed value in knots.

NAV - Navigation Mode

When Navigation Mode is selected the system will enable the aircraft to track a VOR course or an ILS localizer. The CRS value is indicated by a digital display on the upper right of the Horizontal Situation Indicator (HSI) gauge. A pointed white needle on the HSI face shows the direction

of the currently tuned NAV station or ILS localizer. The CRS value can be set using the knob in the lower left corner on the HSI. The digital display will show zeros and can not be set if no station or ILS signal is being received. The knob tooltip will still show the set value, even in a no-signal condition, left-click to select the knob and use the mousewheel to adjust the CRS value. See the section on the HSI below for more information and close-up images.

MCH - Mach Hold Mode

When selected the system maintains the current existing Mach value. The MACH value can be adjusted by using the Mach Set Switch, located below the Speed Indicator to the left of the VSD, this is a small gray rectangular switch. Click and drag the switch up or down to set a Mach value.

APR - Automatic Approach Mode

When selected the aircraft will steer to follow the ILS localizer and glide slope signals from the station tuned into the active frequency of NAV1 on the centre console.

VS - Vertical Speed Hold Mode

When selected the system maintains the current vertical speed value which is set on the Altitude / Vertical Speed indicator using the small gray rectangular switch. Click and drag the switch up or down to set a VS value in feet per second.

Horizontal Situation Indicator (HSI)

DME DISPLAY - distance in nautical miles to the currently tuned NAV1 station. The NAV1 Radio is located in the front left area or the Center Console.

NAV1 DIRECTION NEEDLE - direction of the currently tuned NAV1 station. The NAV1 Radio is located in the front left area or the Center Console.

ADF NEEDLE - will indicate the direction of the currently tuned NDB. The ADF Radio is located in the center area or the Center Console.

HEADING BUG - indicates the direction of the currently set autopilot heading value.

CRS DISPLAY - value in degrees of the currently set NAV course. Zeros will display if no NAV1 station signal is being received.

CRS SET KNOB - sets the NAV course value which is displayed in degrees at the top right side of the HSI. The knob tooltip will still show the set value, even in a no-signal condition, left-click to select the knob and use the mousewheel to adjust the CRS value.

HDG SET KNOB - sets the autopilot heading value which is indicated by the Heading Bug on the outside of the HSI compass ring. The knob tooltip also shows the set value, left-click to select the knob and use the mousewheel to adjust the HDG value.

Pilot Annunciators

Four warning lamps for Speedbrake, Stall, Low Fuel and Icing are arranged immidiately above the VSD screen.

Pitot Heater

The forward warning light panel contains pitot heat warning lamp.

If the outside air temperature drops below 1 deg. C, lamp will illuminate amber and the Master Caution will illuminate.

The pitot heater switch is located on the overhead panel, forward right side.

Stall Warning

The forward warning light panel contains a stall warning lamp.

If the angle of attack reaches 13 degrees, lamp will illuminate red and the Master Caution will illuminate.

The aircraft will enter a stall at 15 degrees angle of attack. This will typically involve a left wing drop and will be recoverable if sufficient altitude is available.

Vertical Situation Display (VSD)

Left clicking the mode knob will cycle forwards through modes. Right clicking will cycle backwards.

The default mode is ADI. This displays basic information. Central to the display is the pitch and roll ladder. This acts as an artificial horizon. Along the top of the display is a progressive gyro heading indicator, above which is a digital readout of the current exact heading.

TER FLW mode builds on the ADI by adding a digital speed readout in the top left corner, and an altimeter readout in the top right corner. This is the best screen to use for normal operations.

TER AVD mode is like TER FLW mode, except the altimeter readout is from the radar altimeter rather than the usual indicated altitude.

LS/AILA mode displays a digital course deviation indicator along the bottom of the ADI. If a glideslope is available, a similar glideslope deviation indicator will display along the left side of the ADI.

Altitude and airspeed indications are also visible in this mode.

TEST mode displays all available functions, along with the text ‘TEST’ in the bottom right corner.

Airspeed / Altitude Indicators

Central Panel

1. Engine Fire Control Panel
2. Ground Speed/TAS Ind.
3. Bomb Bay Doors Switch
4. Weight/CG Indicators
5. Total Fuel Flow Gauge
6. Fuel Quantity Indicators
7. Fuel Weight Indicators

Engine Fire Control Panel

Each engine has a fire warning lamp which, when pressed, will shut down the engine and extinguish the fire.

To extinguish a fire, the 'AGENT DISCH' switch must first be set, either to 'main' or 'res' (use left or right mouseclick). Unless the agent switch is in an active position, the fire extinguisher button will remain operable, but inactive.

The fire switch-lights for OWF and APU are not active.

The small central button can be pressed to test the lamps.

Ground Speed / True Air Speed Indicator

Depending on the selected mode, this will display the speed over the ground or the true airspeed in knots. This is useful when taxying or to test the wind speed before take-off.

CG, Weights and Total Fuel Flow Indicators

The vertical scale on the CG instrument shows the actual and target Center of Gravity as Percent of MAC. The target bug can be adjusted up and down using the adjacent knob (use both left and right mouse input). This is merely a guide and does not have any affect on the simulation.

The two digital displays show the current all-up-weight on the ground of the aircraft as well as the total weight of the currently loaded fuel.

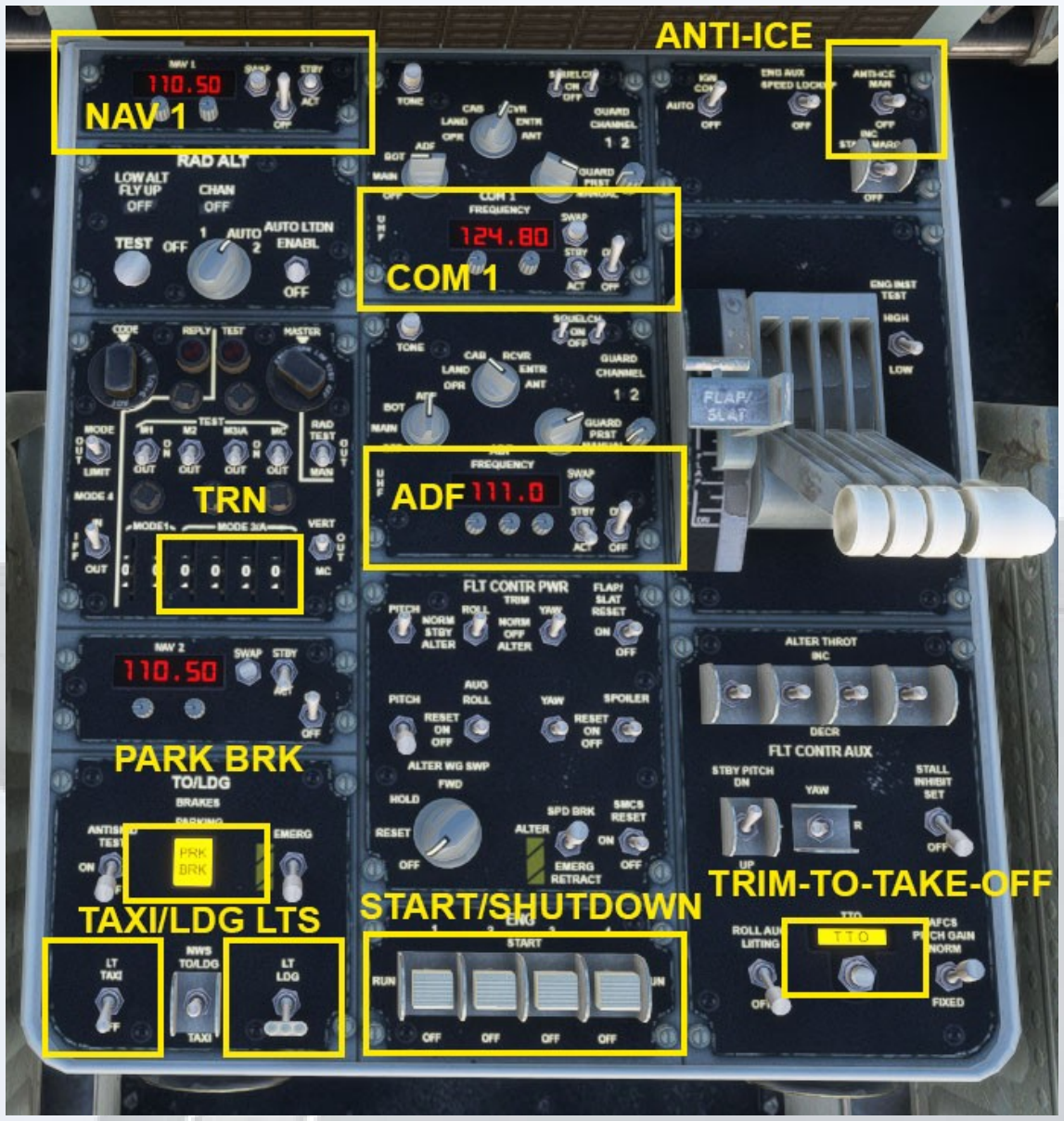
The other instrument shows the real-time total fuel flow to all running engines.

Fuel Quantity and Weight Indicators

The upper tape-style display shows the current fuel quantity in each of the aircraft's fuel tanks.

The lower two digital displays show the weight of the fuel in whichever tanks are selected using the grey 'SEL TK' knob, positioned below the digital displays.

Center Console



Engine Starter / Shutdown Switches

Left-clicking a control switch will cause it to enter the START position, and spring back to RUN after the engine start sequence has been initialised.

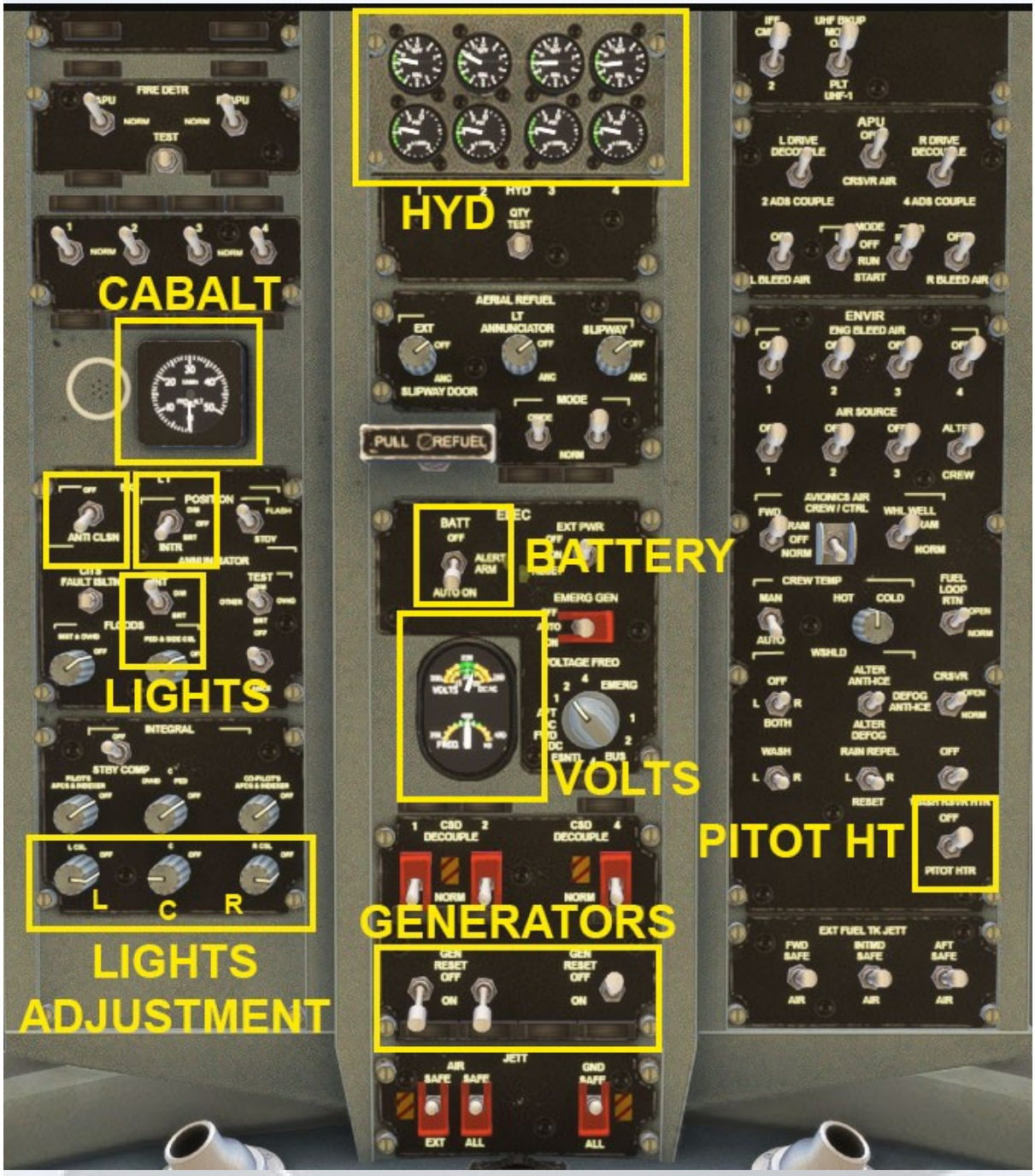
Right-clicking the switch will cause it to go to the OFF position, cutting the fuel to the engine and thus shutting it down.

Trim-To-Takeoff (TTO) System

In order to prepare for take-off, the Trim-Take-Off (TTO) button should be clicked once. The yellow-illuminated TTO display will turn off after a few seconds, meaning all the surfaces are now in the correct position. If the display is already in the off state, then this indicates that all surfaces were already correct for take-off and no further action is necessary.

The TTO system sets wings fully forward with the flaps deployed by one notch and retracts the speedbrakes (if deployed). The process will take a few seconds to complete. Any subsequent flap or trim system changes will cause the TTO to illuminate yellow and therefore require a reset. The system will only function when the aeroplane is on the ground.

Overhead Console



Virtavia B-1B Lancer Procedures

Engine Start:

1. Set parking brake (center console lower left).
2. Set throttles to IDLE.
3. Switch all Generators to OFF.
4. Turn on the Master Battery switch on overhead electrical panel.
5. Check volts/freq gauge next to the battery switch. Both should read in the green.
6. Push the "Push to Test" button on the Fire Warning and Extinguisher Control Panel (top center of main panel) to verify all ENG, APU and OWF fire warning lights are functional.
7. Turn on Generators 2 and 3 (overhead console).
8. Start Engines 2 and 4 using the engine start switches (center console aft).
9. Monitor engine parameters, allow for engine to stabilize at ground idle (approximately 25% N1).
10. Start Engines 1 and 3 and monitor engine parameters.
11. Turn on Generator 1 (overhead console).

NOTE: For simplified procedure, use Ctrl+E for auto engine start.

Taxi:

1. Prior to taxi check flight control surfaces by moving joystick and rudder pedals and verifying control surface movements on the Surface Position Indicator panel on the main panel.
2. The B-1B will require a different amount of thrust to break away depending on weight. It is not unusual at high gross weights to use up to 70% N1 to start rolling.

3. Use the lowest amount of thrust necessary to start rolling. Using excessive amounts of thrust will cause you to accelerate faster than you intended. Remember, engines are still producing thrust as they spool back down to idle.
4. Once you attain 12-15kts of taxi speed slowly reduce power to idle. The aircraft will taxi on idle thrust above this speed, but may require slightly more than idle at high gross weights.
5. Use maximum nose wheel steering deflection whenever possible. The use of differential braking is discouraged due to heat build-up in the brakes.

Takeoff Data:

Takeoff procedure (if noise abatement/speed restrictions unnecessary):

1. Push the Trim for TakeOff button (TTO) on the center console. This automated system will configure the aircraft for takeoff. As necessary, the wings will move to maximum extension angle (15°), speed brakes will retract, and the slats and flaps will extend to takeoff position. When ready the TTO light will turn off. Verify slat and flap positions on the Surface Position Indicator panel on the main panel.
2. Hold brakes and slowly increase power to approximately 80% N1. When engine readings appear stable, increase power to maximum.
   NOTE: Afterburners engage automatically above 98.5% N1.
3. Accelerate to rotation speed and slowly pull back on the stick to attain a positive pitch rate and hold.
4. As soon as positive climb rate is verified, raise landing gear.
5. Adjust trim as necessary after gear has retracted.
6. Regardless of gross weight, retract trailing edge flaps at 220 KIAS.
7. Passing through 250 KIAS, retract slats and reduce pitch angle to approximately 6°.

8. Proceed to Climb Procedure checklist.

Climb Procedure (all weights):

1. At 280 KIAS, sweep the wings to the intermediate position (flap position 1). Adjust trim as necessary.
2. At 340 KIAS, sweep the wings fully (flap position 0).

Descent and approach (all weights):

1. Normal descents should be made at 300 KIAS, whichever is greater.
2. Descents should be planned well in advance of the actual execution due to the B1-B's inherent low-drag profile. It is very easy for this aircraft to gain a significant amount of airspeed in steep descent profiles.
3. Reduce the wing sweep to the intermediate position (flap position 1) at 300 KIAS.
4. Upon beginning the deceleration for approach to landing, reduce wing sweep fully spread (flap position 2) at 280 KIAS.
5. Lower landing gear at or below 275 KIAS if landing.
6. Extend wing flaps to their 1st position at 260 KIAS (flap pos. 3).
7. Extend wing flaps to their 2nd position at 230 KIAS (flap pos. 4).
8. Extend wing flaps to their 2nd position at 200 KIAS (flap pos. 5).
9. Proceed to Landing checklist.

Landing:

1. Establish on the approach path to the desired runway.
2. The B-1B does not use airspeeds as an index for approach, but rather angle-of-attack. Angle-of-attack can be adjusted both by changing the airspeed and the pitch being flown. There is an Angle-of-Attack Indexer on the glare shield. A yellow circle indicates you are flying the correct glide path. The top downward

pointing arrow, when illuminated, indicates that the approach is too shallow. An upward pointing arrow below the circle indicates that more speed is required to reduce the sink rate.

3. Fly to the yellow circle during the approach, utilizing whatever speed is necessary to attain it. Aircraft gross weight will determine what speed will produce the required angle-of-attack.
4. Plan for a 500-800ft/min sink rate on final approach.
5. At 50ft AGL, reduce power to idle and begin a flare of 2-3 degrees and hold until the main wheels contact the runway.
6. Fly the nose to the runway and begin maximum wheel braking.
7. Aerodynamic braking is not recommended due to the long roll-out of the B-1B and lack of thrust reversing.
8. Apply the speed brakes to aid in slowing.

Go-around/missed approach:

1. If performing a go-around or missed approach, immediately increase power to maximum dry thrust (98.4% N1). Afterburner augmentation is unnecessary and may cause the aircraft to accelerate too quickly to handle in the pattern.
2. Retract the landing gear as soon as positive rate of climb is verified.
3. Retract flaps, maintain wings fully spread (flap position 2).
4. Maintain approximately 250 KIAS in the pattern until another approach can be conducted, then proceed to descent/approach checklist, step 7 and continue.

Engine Shutdown:

1. Turn off generators 2 and 3.
2. Shutdown engines 2 and 4.
3. Shutdown engines 1 and 3.

4. As engine 1 winds down turn generator 1 off.
5. Switch Battery to OFF on overhead panel.