# Rockwell B-1B Lancer™

## USER 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-1As™ first flew in 1974 but soon ran into political trouble.

The project was cancelled in 1977 when only 3 prototypes existed. 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

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B-1B Lancer™

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# Exterior Model

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

Fully animated swing wing with leading edge slats (automatic on load-in only, uses flap key variable).

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

Speed brakes (/-key).

Opening cockpit hatch (shift-e), or click warning light.

Opening bomb bays on 2nd Exit (shift-e + 2), or click warning light.

On models with extra fuel tank, bay opens with 3rd Exit (shift-e + 3), or click warning light.

FWD Fuel Tank on Early (ACLM) model: this is permanently closed, it would not be usual to open it in flight.

Togglable crew figures (ctrl-w).

# 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.

# Alternative Viewpoints in FSX

There are several different ways of looking at the aircraft and the cockpit, select these alternative views by right-clicking in an empty area and picking the 'Aircraft' menu for external views and the 'Cockpit' menu for views inside the cabin.

**External View Options**

Right Wing View



Left Wing View



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Tail View



Landing Gear View



Forward Bomb Bay View

## Aft Bomb Bay View



## Refuelling Tanker View

# Cockpit Views

Pilot's View (zoomed out)



Copilot's View



Center Console View View



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Overhead Panel View



Cockpit Entrance View



# Virtual Cockpit Functions

Over the next few pages are several diagrams designed to aid in cockpit familiarisation. Whilst the exterior aeroplane may differ in configuration, the cockpit is uniform throughout.

All systems that are labelled may be operated by clicking them with your mouse. Please read the descriptions carefully in order to fully understand what each switch, button, or lever, does.

Note that multi-selection 'selector knobs' require right mouse clicks to advance, and left mouse clicks to return.

# Main Panel



| | |
|---|---|
| 1. Autopilot controls | 14. VDU mode selection control |
| 2. Mach adjuster | 15. RALT warning control |
| 3. Mach hold | 16. Kollsman adjustment knob |
| 4. Speed hold | 17. Altitude hold |
| 5. Speed adjuster | 18. Altitude selector |
| 6. Pitch trim control | 19. Marker lamp panel |
| 7. Warning lamp indicator panel | 20. Artificial Horizon cage button |
| 8. Engine out warning lamps | 21. TAS/ GS toggle |
| 9. NAV/GPS switch | 22. Kohlsman |
| 10. VSD contrast control | 23. Control surfaces position indicator |
| 11. Course selector control | |
| 12. Flight director switch | 24. Bomb bay control switch |
| 13. Heading selector control | 25. Master audio warning mute |

# Center Panel



1. Port fire bottle selector
2. TAS/GS Toggle
3. Control surfaces position indicator
4. Fire extinguisher buttons
5. Fire warning test lamps
6. Starboard fire bottle selector
7. Engine condition indicators
8. Bomb bay control switch
9. Fuel weight and tank selector control
10. Fuel level indicators
11. Total fuel weight indicator
12. Aircraft weight indicator
13. Total fuel flow rate indicator
14. Centre of Gravity Management
15. Centre of Gravity Target Select (non-functional)
16. Fuel dump switch

# Left Side Panel

1. Seat height adjuster

2. Wing sweep control lever

3. Throttle levers

4. Elevator trim control switch

5. Rudder trim control switch

# Center Console



1. NAV Unit
2. COMM Unit
3. Anti-ice switch
4. Transponder unit
5. ADF unit
6. Flap lever
7. Throttle levers
8. NAV2 Unit

9. Anti-skid control switch
10. Taxi lights switch
11. Parking brake switch
12. Landing lights switch
13. Engine control switches
14. Elevator trim switch
15. Rudder trim switch
16. Trim for Take Off (TTO) button

# Overhead Console



1. Cabin altitude indicator

2. Strobe lights switch

3. Navigation lights switch

4. Panel lights switch

5. Refuelling handle

6. Master battery switch

7. Generator control panel

8. Pitot heat switch

# Aircraft Systems and Operation

This section of the manual details individual systems and their operation.

**Wing Sweep Inhibitor.**

If the landing gear is deployed whilst airborne, the wings cannot be swept back past 30 degrees, as indicated by the wingsweep gauge. If, whilst airborne, the wings are already swept back past 30 degrees and the landing gear is deployed, the wings will automatically sweep forward to the 30 degree position.

**Master Audio Cut-out**

Pushing the Master Audio Cut-out button will turn off all radio and marker identification sounds. The button is located on the top left side of the forward panel.
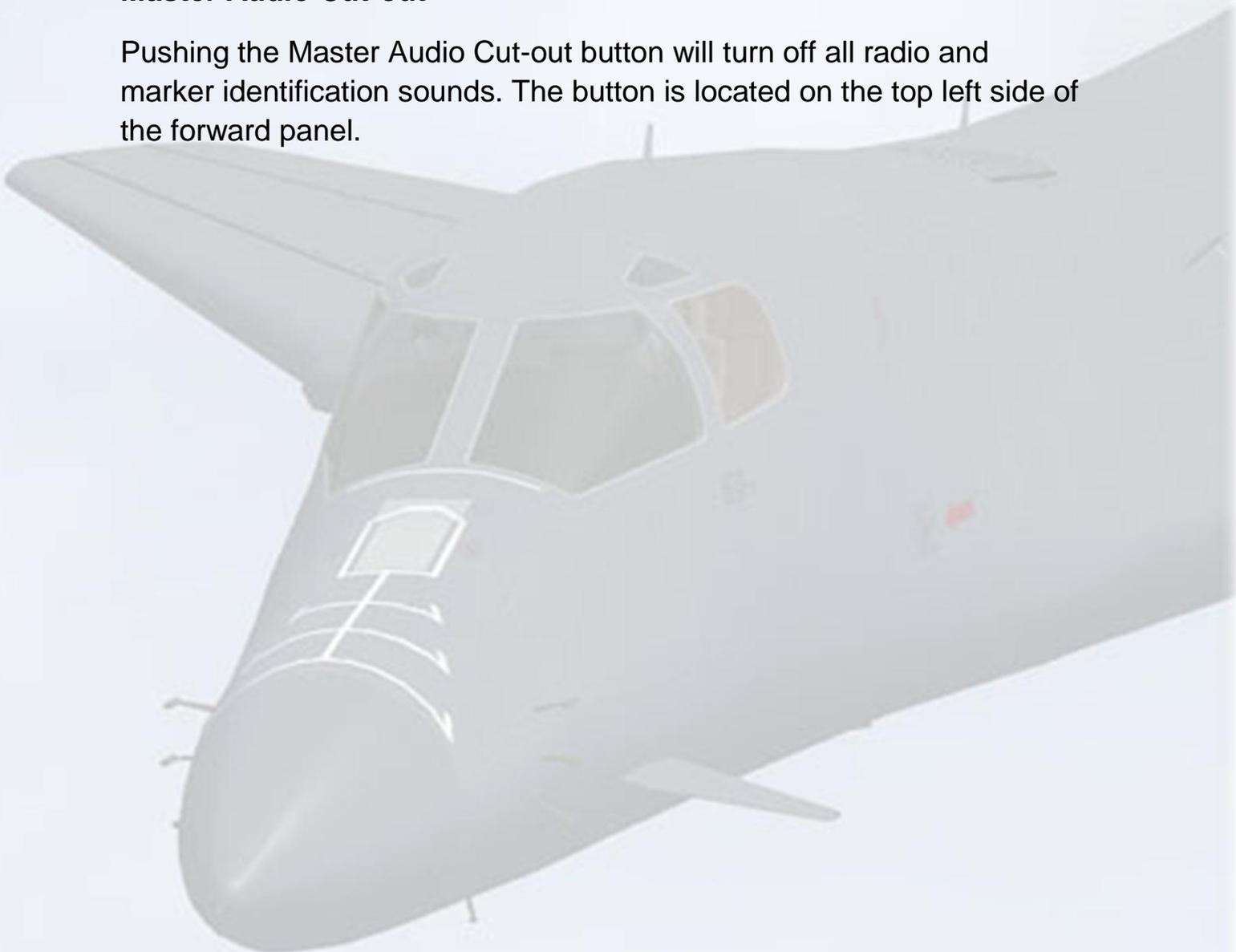
# Vertical Situation Display (VSD)

By default the VSD is turned OFF. Left clicking the mode knob will cycle backwards through modes. Right clicking will cycle forwards.



The VSD can be dimmed for night operation by using the contrast knob to the left of the turn and slip indicator. 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.

When the flight director is activated, a target crosshair will appear over the pitch and roll ladder.



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.

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.

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

# Trim System

Left clicking trim switches will apply a negative value to the trim. Right clicking will apply a positive value.

In order to prepare for take-off, the Trim-Take-Off (TTO) button should be pressed and held until the TTO display indicates a green 'TTO' icon.

The TTO system sets wings fully forward with the flaps fully deployed and retracts the spoiler. The process will take 30 seconds to complete. Any control input or trim system changes will cause the TTO to require a reset. The system will only function when the aeroplane is on the ground.

Pitch trim is set manually using the white knob located atop the left of the VSD.

# Engine Control 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. The switch will stay in the OFF position until bought back to RUN using the left mouse button.

# Autopilot

Autopilot controls can generally be operated by clicking the gauge fascia. Left clicking will decrease the selected value, and right clicking will increase.

### 5.4.1 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 a function is engaged the lined-through blue text of the function will turn off and a green text version will appear.

### 5.4.2 CMD - Command Mode

This is the autopilot master switch. Selecting it engage wing and pitch levelling.

### 5.4.3 ALT - Altitude Hold Mode

When Altitude Hold Mode is selected the system maintains the current existing altitude. A new altitude setting can be established by flying the aircraft to a new altitude and re-engaging the function. The selected altitude can be adjusted by clicking the "altitude selector" window, located below the vertical altimeter to the right of the VSD.

### 5.4.4 NAV - Navigation Mode

When Navigation Mode is selected the system will enabling automatic tracking of a VOR, GPS course, or localizer. If the left selector knob of the Vertical Situation Display (VSD) is set to NAV the aircraft captures and steers towards the VOR course or localizer tuned on the active frequency of NAV1 on the centre console. If the left selector knob of the VSD is set to GPS and a flight plan is loaded the aircraft will track to the next waypoint.

### 5.4.5 HDG - Heading Hold Mode

When selected the system will adjust the aircraft heading to whatever is indicated on the Horizontal Situation Indicator (HSI) gauge below the VSD. Adjustments can be made using the knob in the lower left corner on the HSI. The selected heading bug rotates around the compass ring on the HSI.

### 5.4.6 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. Selecting ILS/AILA on the VSD automatically engages the Automatic Approach Mode. It can be manually disengaged by pushing the APR switch-lights. Virtavia Pty Ltd B-1B Lancer Manual Manual revision 1.01 for FSX version 1.00 Page **34** of **37**

### 5.4.7 SPD - Airspeed Hold Mode

When selected the system maintains the current existing airspeed. Clicking the display window will allow adjustment to be made.

### 5.4.8 MCH - Mach Hold Mode

When selected the system maintains the current existing Mach value. Clicking the display window will allow adjustment to be made.

### 5.4.9 LOC - Localizer Back Course Mode

When selected the Localizer Back Course Mode enables automatic tracking of a localizer back course for instrument approaches. This works like the Automatic Approach Mode (APR) except the glide slope is disabled and the autopilot's response to a localiser signal reversed.

# Failure Systems

Two unique scenarios covering engine failures are built into the B-1B package. The failures menu can be accessed by going to 'Aircraft -> Failures' via the header menu whilst in game.
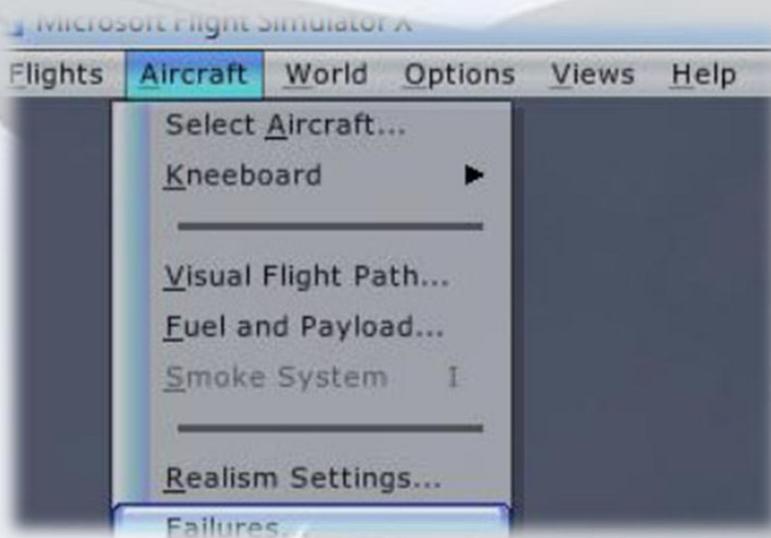


**Engine Failure**

If 'Engine Fail' is selected from the in-game failures menu, a series of events will occur to simulate just that. This will include illumination of relevant lamps and run-down of the turbine itself.

Lamps that should be monitored include the hot oil warning, high vibration warning, and the master caution panel cluster.

## Engine Fire

If 'Engine Fire' is selected, a series of events to simulate an engine fire will occur. A proper sequence is to be followed in order to extinguish the fire.

Should a fire occur, the relevant engine fire light(s) will illuminate. Smoke and flames may appear from the affected engine. First push the relevant engine switches to the OFF position. The fire extinguisher system should then be utilised by first selecting the correct engine pod. The extinguisher system has two supplies- MAIN and RES, either of which can be selected.

Once a supply and pod are selected, pressing the FIRE warning lamp will attempt to extinguish the fire and shut down the engine.

An audible warning will also sound should a fire occur. To cancel the warning manually, press the Master Audio button, located atop the front left panel.

## Hatches & Entries

Should a malfunction occur with the hatches, or they simply be left open, the master caution light will illuminate. The exit-unlocked lamps will also illuminate red and will blink.

The amber exit-unlocked lamps will illuminate when an exit is open and unsecured.

## Pitot Heater

The forward warning light panel contains pitot heat warning lamp. The lamp will illuminate green when the heater system is turned ON and amber when turned OFF.

If the outside air temperature drops below 5 deg. C, lamp will illuminate amber. Once OAT reaches zero, the lamp will flash red and Master Caution will illuminate. An audible warning tone will sound should the system not function correctly. To mute the sound, press the Master Audio button, located atop the front left panel.

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

REFERENCE INFORMATION

## Virtavia B-1B Lancer Procedures

### Notes on Aircraft Configuration selection:
The user must manually edit the Aircraft.cfg prior to flying the aircraft.

**NOTE:** This should be accomplished preferably before FSX is started to ensure the aircraft loads with the selected configuration. However, if the user enables the "aircraft (reload)" command under the controls section in FSX, reloading the aircraft in the sim will update all changes made to the Aircraft.cfg once the aircraft has spawned in.

Under the [weight and balance] section of the Aircraft.cfg, you will find a number of different loadouts available. Depending on the aircraft configuration you wish to use, you will need to manually enable or disable certain loadouts prior to flying. Each configuration has detailed instructions above it to explain how to make these changes. Ensure all other loadouts not in use are appropriately marked with double slashes " // " so they are not read by the FSX flight dynamics engine.

### 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/freqs gauges next to the battery switch. Both should read in the green.

6. Push the "Push to Test" button on the Fire Warning and Extinguishing 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 4 (overhead console).

8. Start Engines 2 and 4 using the engine start switches (center console aft).

9. Monitor engine parameters, allow 45-60 seconds 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 on.  Verify slat

and flap positions on the Surface Position Indicator panel on the main panel.

2. Apply up trim as necessary using switch on pilot's left side console or knob on VSD.

   Trim settings for takeoff (CG):

   20% MAC = 5.5 up

   22% MAC = 3.5 up

   24% MAC = 1.5 up

   26% MAC = 0.5 up

   28% MAC = -1.0 down

   30% MAC = -3.0 down

   Reference MAC value on CG/GW gauge
   to the right of the engine gauges

3. 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.

4. Accelerate to rotation speed and slowly pull back on the stick to attain a 2.5°/sec pitch rate to 10° and hold.
   Use the following table to for rotation speeds (extrapolate for weights not listed):

   470,000 lbs = 180 KIAS

   400,000 lbs = 165 KIAS

   350,000 lbs = 150 KIAS

   300,000 lbs = 135 KIAS

   250,000 lbs = 120 KIAS

5. As soon as positive climb rate is verified, raise landing gear.

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6. Adjust trim as necessary after gear has retracted to maintain 10° hands-free.

7. Regardless of gross weight, retract trailing edge flaps at 220 KIAS.

8. Passing through 250 KIAS, retract slats and reduce pitch angle to 6°.

9. Proceed to Climb Procedure checklist.

**Climb Procedure (all weights):**

1. At 280 KIAS, sweep the wings to 20° (flap position 4). Adjust trim as necessary to maintain hands free pitch of 6°.

2. At 310 KIAS, sweep the wings to 35° (flap position 3). Adjust trim as necessary to maintain hands free pitch of 6°.

3. At 340 KIAS, sweep the wings to 45° (flap position 2).

4. At 360 KIAS, increase pitch to maintain that speed. Reduce thrust to military power (the maximum power that does not engage the afterburner, approximately 98.4% N1). Use pitch to maintain a climb speed of 360 KIAS until reaching Mach .85, and then use Mach .85 as the reference climb speed.

5. At and above Mach .85, increase wing sweep to 55° (flap position 1).

6. At speeds above Mach .95, increase wing sweep to the maximum 67.5° (flap position 0).

7. Select the optimum cruise altitude from the chart below (extrapolate for weights not listed):

**Sub-sonic cruise:**

The chart below lists the recommended maximum altitudes for cruising using dry thrust (no afterburner/less than 98.4% N1) to maintain at or around Mach .87 for normal and ferry-flight operation:

Gross weight: Maximum altitude for normal cruise:

| | |
|---|---|
| 470,000lbs | 31,000ft |
| 400,000lbs | 34,000ft |
| 350,000lbs | 36,000ft |
| 350,000lbs | 38,000ft |
| 250,000lbs | 40,000ft |

## Effect of wing sweep to cruise performance:

For normal cruise at or around Mach .87, it is intended for the wings to be swept at 55° (flap position 1). However, if one wishes to reduce the deck angle of the aircraft cruising at a particular altitude with a higher-than-recommended gross weight, it is possible to decrease the wing sweep to 45° (flap position 2). This will have the effect of increasing the efficiency of the wing to create lift at that sub-sonic speed. The tradeoff is higher induced drag, which will necessitate a slightly higher power setting. The tradeoff should result in less than a 3% range penalty.

## Notes on fuel tanks and tank usage (normal operation)

The following is a table of the available fuel tanks and descriptions of each:

| | | | |
|---|---|---|---|
| Center1 | 30,855 lbs | Fuselage Tank 1 | "Fwd" |
| Center2 | 50,435 lbs | Fuselage Tank 4 | "Aft" |
| LeftMain | 23,116 lbs | Fuselage Tank 3 | "Aft Intermediate" |
| RightMain | 37,606 lbs | Fuselage Tank 2 | "Fwd Intermediate" |
| LeftAux | 9,600 lbs | Main Tank L | |
| RightAux | 9,600 lbs | Main Tank R | |
| LeftTip | 15,532 lbs | Wing Tank L | |
| RightTip | 15,532 lbs | Wing Tank R | |
| External1* | 8,352 lbs | Weapon bay | Optional Fwd bay tank |

| | | | |
|---|---|---|---|
| *For ALCM armed version use capacity of 8,352 lbs. For Mk82 load use capacity of 18,870 lbs. | | | |
| External2 | 18,870 lbs | Weapon bay | Optional Aft bay tank |

**Note:** External1 and External2 are the weapon bay optional tanks. They default to fully-fueled, and must be manually adjusted depending on the aircraft configuration chosen. Failure to manually reduce the quantities of these tanks prior to flight will result in excessive gross weight and unrealistic range figures.

**Order of fuel burn (normal operation):**

1. External1 and/or External2 burn 1st until empty.

2. LeftTip and RightTip burn 2nd once External1 and/or External2 are empty. Center2 burns simultaneously with LeftTip and RightTip until empty.

3. LeftAux and RightAux burn 3rd once LeftTip, RightTip, and Center2 are empty. Center1 burns simultaneously with LeftAux and RightAux until empty.

4. LeftMain and RightMain burn last after all other tanks are empty. Remember, these are actually fuselage main tanks and not located in the wings.

**Descent and approach (all weights):**

1. Normal descents should be made at Mach .85 or 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 35° (flap position 3) at 300 KIAS.

4. Upon beginning the deceleration for approach to landing, reduce wing sweep to 20° (flap position 4) at 280 KIAS.

5. Lower landing gear at or below 275 KIAS if landing.

6. Reduce wing sweep to the minimum sweep of 15° (flap position 5) and extend slats at 250 KIAS (flap position 6).

7. Extend flaps to position 1 at 220 KIAS (Flap position 7).

8. Extend flaps to position 2 at 200 KIAS (Flap position 8).

9. Extend flaps to position 3 at 180 KIAS (Flap position 9).

10.      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.  If you cannot see the AOA Indexer adjust the seat height using the Seat Adjustment Switch on the side console.  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 that does not result in a skid condition (anti-skid system is enabled by default).

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 to position 1 (Flap position 7).

4. Maintain approximately 220 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 4.

2. Shutdown engines 2 and 4.

3. Shutdown engines 1 and 3.

4. As engine 1 winds down turn generator 1 off.

5. Once crew chief has verified complete shutdown with no engine fires, switch Battery to OFF on overhead panel.