Introduction

A technological tour de force of epic proportions, the legend of the XB-70 Valkyrie™ very nearly surpasses the performance of this extraordinary aircraft. Built in the 1960s as a result of a USAF proposal for a supersonic bomber with high subsonic cruising speed and supersonic dash capabilities, the massive XB-70™ was to have carried the same bombload as the B-52 Stratofortress™ at a higher supersonic speed than the Air Force's current strategic bomber, the B-58 Hustler. A later requirement specified that the plane be able to fly the entire mission at Mach 3.0 or greater, with a range of up to 10,500 miles and a maximum gross weight of 490,000 pounds. In the event, technology quickly relegated the Valkyrie™ to the role of supersonic research testbed and flagship of the USAF's public relations fleet. Ground-to-air missiles and advanced radar made the XB-70's™ supersonic mission impossible. The bomb bay of the aircraft was instead packed with data acquisition equipment, and the information gathered helped propel the United States Air Force even further into the supersonic jet age, with the information going to help develop future generations of supersonic interceptors.
Support

Should you experience difficulties or require extra information about the Virtavia XB-70A Valkyrie™, please e-mail our technical support on tech.support@virtavia.com

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North American XB-70A Valkyrie™

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Exterior Model

The exterior model has all the usual animations such as ailerons, elevators and flaps, these are however implemented in unusual ways:

Ailerons/Elevators
Roll and pitch functions are combined in the large elevons at the trailing edge of the delta wing.

Rudders
Yaw function is controlled by movement of the whole of the upper surfaces of the twin vertical stabilizers. The twin rudders operate relatively normally, they do however slant slightly when operated due to their angular mountings.

Flaps
The flaps function in FSX will cause the wing tips of the XB-70 to cant downwards. There are only two settings for the wing tips and they are used at certain cruise speeds, not for landing or take-off. Refer to the Checklist/Procedures for the speed ranges specific to wing tip settings.

Nose Visor
The nose default position is ‘down’, this is the correct position take-off and landing. The nose should be raised to ‘up’ for high-speed cruise. This is achieved via a switch in the cockpit or by pressing the normal exit command (Shift-E).

Toggle Crew
2nd exit command (Shift-E+2) is used to toggle the pilot figures on or off.

Speedbrakes
The speedbrake function (/ key) operates the trailing edges of the nose-mounted canards.
Exterior Lighting

Pressing the L key will turn on all lights. This is not advised because of the way the afterburner effects work. Pressing L will interfere with the AB flame effects and may well turn them on or off unexpectedly. The correct way to operate the lights is to use the panel switches, or press shift-2 to bring up the lighting panel pop-up.

There are no landing or taxi lights on the XB-70.

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. It is possible to zoom and pan as normal in these alternative views. Cycle though the available ones by pressing the A key.

External View Options

It is possible to pan and zoom as normal in all external views.

Right side view

Left side view
**Interior View Options**

Default virtual cockpit view

Co-pilot view

Center panel view
Moving Around the Cockpit

Shift-Enter and Shift-Backspace : moves up and down
Ctrl-Shift-Enter and Ctrl-Shift-Backspace : moves side to side
Ctrl-Enter and Ctrl-Backspace : moves backwards and forwards

Virtavia XB-70 Valkyrie - Condensed Procedures
Flight Characteristics and Flight Modelling

The Virtavia XB-70 Valkyrie was created using the original XB-70A™ Flight Manual, the cover of which is reproduced above. Extreme care was taken to replicate as closely as possible the features and characteristics of this unusual and iconic aircraft.

Virtavia aircraft are primarily designed for people who like to spend their time flying rather than following lengthy and complicated procedures, so many of the design features of this plane are automated, such as the fuel management. This reflects the design philosophy of the real plane, where as many of the complex systems as possible were given over to fully automatic control. We urge anyone truly interested in the history and flight characteristics of this amazing aircraft to purchase the actual XB-70A Flight Manual. Our aircraft can be operated according to the actual procedures and will match the published specifications with a very high degree of accuracy.

Virtavia XB-70A Valkyrie™ – DTG Steam Edition
Manual Version 1
The Valkyrie is an advanced delta wing design. The delta wing does not stall as a conventional wing does. There is no well-defined stall; the aircraft will begin to mush and pitch up once a critical angle of attack is exceeded. For this airplane, do not exceed 17 degrees angle of attack. If this is exceeded the nose will continue to pitch up and it may take full forward stick to recover. The canard provides a good measure of control at high alpha, unlike other delta wing designs, and the canard can be seen now on all modern delta wing aircraft, such as the Gripen and Eurofighter Typhoon.

The aircraft is quite stable and the controls are very well harmonized, and it is surprisingly responsive for an aircraft of its size. However, the airframe is not up to high G maneuvers. In fact, negative Gs are prohibited as are all acrobatics and sudden manoeuvres. Please review the aircraft limitations for specific information.

**Fuel Supply**

The XB-70 had fuel tanks crammed into every nook and cranny of the wings and fuselage. All the tanks were interconnected through a complex system of transfer lines and pumps which allowed for completely automatic fuel and weight management. However, the actual amount of fuel the plane could carry varied with the specific mission configuration, and each of the two aircraft produced had a different fuel capacity. A normal takeoff fuel load was about 135,000 lbs of fuel, but the plane could carry much more. This flight model has been set up to carry a maximum of 240,000 pounds of fuel, enough to allow it to meet the published range specifications. This results in a takeoff weight of just over 470,000 lbs.

**Engine Management**

Flight Simulator does not allow for more than four engines. The engines are arranged in the flight model as follows: (1, 1), 2, 3, (4, 4). That is, the outer pairs of gages show information for Engines 1 and 4, while the inboard gages show information for Engine 2 and 3. The thrust has been adjusted so that the four engines in this flight model produce the same power as the six engines in the real aircraft. That is, each engine in the flight model makes 150 percent of the rated power, which is the same as if we could have six at the normal power rating. Thus, there is no compromise in performance. Unless you are operating with one or more engines out, this arrangement will be transparent; you'll perceive there are six operational engines, and each of the six "virtual" engines has its own dedicated instruments.
Specifications

- Crew: 2
- Length: 185 ft 10 in (56.6 m)
- Wingspan: 105 ft 0 in (32 m)
- Height: 30 ft 9 in (9.4 m)
- Wing area: 6,296 ft² (585 m²)
- Empty weight: 231,215 lb (105,050 kg)
- Loaded weight: 471,214 lb (214,090 kg)
- Max takeoff weight: 550,000 lb (250,000 kg)
- Powerplant: (6) General Electric YJ93-GE-3 turbojet, 31,000 lbf (147 kN) each
- Maximum speed: Mach 3.1 (2,360 mph, 3,800 km/h)
- Range: 4,288 mi (7,900 km) combat
- Service ceiling: 77,350 ft (23,600 m)
- Initial rate of climb: 27,450 ft/min (140 m/s)
- Armament: None. Data acquisition equipment carried in central bay.

Aircraft Limitations

- Stall, clean: 165 knots IAS (470,000 lbs.)
- Stall, canard flap and gear down: 155 knots IAS
- Minimum flying speed, canard flap fully down: 190 knots IAS
- Maximum canard flap extension: 270 knots IAS
- Maximum gear extension: 275 knots IAS
- Gear damage: 325 knots IAS
- Maximum G: +1.6, +0.4
- Negative Gs prohibited
- All acrobatics prohibited
- Any sudden or sharp manoeuvre is to be avoided
- Nose ramp positioning: no speed limitation (recommend UP for supersonic flight)
- Wing tip positioning: see schedule below
Pop-up Panels
Wing Fold Function

The variable-fold wings are manually adjusted and need to be set into the correct position by the pilot, depending on the aircraft's indicated airspeed or Mach number. Use the switch on the main 2D panel to position the wing tips, or use the "flaps" key to set this position.

Nose Ramp (visor)

The nose ramp reduced drag in the real aircraft but has only a cosmetic function in this model. It can be raised using the button on the main 2D panel or by using the tailhook up/down command.

Canard Flap

The canard flap extends to a single position on the "spoilers" key or using the canard flap switch on the main panel.

Power Schedule

There are three ways to set the power in this flight model:

- Reading the mouse tooltip when positioned over the ECU (throttles) popup
- Noting the index mark on the ECU on the popup
- Reading percent of engine RPM on the gages (tooltip is very accurate)

Your joystick throttle slider will provide an accurate and realistic way to set power in the XB-70 Valkyrie. The range from 0-35% of the throttle joystick position (read this value using the mouse tooltip) will provide power from IDLE to full military (MIL) power. At exactly 35% throttle joystick position, 100 percent RPM will be obtained which equals MIL power. Above 35% throttle and 100 % RPM is the afterburning range, which is the most important range for a supersonic aircraft. A full 65% of the range of the throttle control is available to set exactly the right amount of afterburner power and this can be very finely adjusted. This takes the engine into the "overspeed" range from 100-106% RPM. While it may seem that there is only a small range of engine RPM to work with, keep in mind that engine RPM remains more or less constant within a narrow band whilst the afterburners are on. The actual thrust is determined by the amount of fuel being sprayed into the burner cans, not from the engine RPM. However, higher engine RPM does correspond to higher thrust. Engine RPM can be read to 0.01 of a percent, and is easily set and easily repeatable.

Use the alternate view of the throttles by cycling through the virtual cockpit views, or use the popup ECU panel to view and set throttle position and power. The tooltip in percent does not correlate exactly to the ECU throttle index markings, but can be noted and recorded to help set power. See the images below for details, noting the relationship between the mouse tooltip reading and the index marks on the ECU.
**MIL power (for subsonic cruising and economical climbing)**

MIL POWER:
35% TOOLTIP, 45% ECU INDEX MARK
100% RPM

**MIN afterburner (for normal climbing). Use 101.5 percent for a normal climb.**

MIN A/B:
50% TOOLTIP, 55% ECU INDEX MARK
101.5% RPM
Engine Instruments

Fuel flow, oil temperature, and oil pressure can be read in the center of the main panel. Use the mouse to get a direct reading with the tooltip feature.

Engine Start

1. Set parking brake.
2. Set throttles to IDLE.
3. Turn OFF Avionics and Deice switches.
4. Turn all generators OFF.
5. Turn on Master Battery switch.
6. Turn on the main fuel supply to all engines (Ctrl-Shift-F4).
7. Check Fire Emergency fuel cutoff buttons are normal.
8. Start Engine 1 using the engine start switch.
9. Monitor oil pressure and temperature - wait until all annunciator and caution lights go out.
10. Turn on Generator 1.
11. Repeat for remaining engines.
12. Turn ON avionics and set radios as required.

Takeoff (470,000 lbs.)

1. Make sure fuel is sufficient.
2. Set canard flap down.
3. Set all trim controls to neutral using the "Takeoff Trim" button on the 2D panel.
4. Line up on the runway centerline.
5. Set throttle to minimum afterburner and observe that afterburner lights are lit.
6. Advance throttles to full afterburner.
7. Release brakes.
8. Raise nose at 145 knots IAS.
9. Rotate smoothly at 165 knots/305 kph IAS to 10 degrees pitch up.
10. Hold this pitch until the aircraft leaves the runway.
11. When positive rate of climb is established, retract landing gear.
12. Retract canard flap before 270 knots IAS.
13. Reduce power to minimum afterburner (101.5 percent RPM or 50% throttle position).
14. Increase speed to 450 knots IAS until reaching 0.9 Mach.
15. Hold 0.9 Mach for the initial climb to 30,000 feet.
16. Observe transonic flight procedures below.
Tactical Climb and Transonic Flight - Level Flight Technique

The XB-70 is a powerful aircraft. It is very easy to overspeed, so keep your throttles under control at all times. Throttle back to minimum afterburner after reaching 300 knots IAS on climbout after gear is retracted. Accelerate to 450 knots IAS, adhering to the wing position schedule, and climb at that speed until reaching 0.9 Mach, either flying by hand, or using attitude hold to maintain your airspeed. Maintain 0.9 Mach until reaching 30,000 feet. Level off and accelerate using full afterburner to approximately 1.2 Mach. Be ready to throttle back after the aircraft passes through Mach 1.2 as it will accelerate very quickly. Begin climb to desired altitude, maintaining 450 KIAS. Hold this speed until reaching desired altitude.

Tactical Climb and Transonic Flight - Descending Flight Technique

At altitudes higher than 30,000 feet, or at very high aircraft weights, it may be necessary to climb to 33,000 feet at 0.90 Mach, level off, and then descend to 30,000 feet at 3000 fpm to break through the sound barrier. Be ready to throttle back after the aircraft passes through Mach 1.2 as it will accelerate very quickly. Begin climb to desired altitude, accelerating to 450 knots IAS. Hold this speed until reaching desired altitude.

Cruising

When approaching cruising altitude, reduce vertical speed gradually as to intercept the desired altitude smoothly and with minimum of pitching. If pitching up and down (porpoising) occurs, simply turn off the autopilot, stabilize the aircraft at the desired altitude, and then turn the autopilot back on, ensuring that your altitude hold value is the same (within a few feet) as the altitude at which you have stabilized. Set the throttles to obtain the desired cruising speed.

Fuel Management

Fuel and center of gravity management in the XB-70 is fully automatic as with the real aircraft. Fuel is stored in the wings and fuselage. No tank selection or fuel transfer is necessary.

Wingtip Position Schedule

Wingtip position control is manual in this aircraft. Observe the following schedule for positioning.

<table>
<thead>
<tr>
<th>Speed</th>
<th>Wing Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; Mach 0.95/400 KIAS</td>
<td>UP</td>
</tr>
<tr>
<td>&gt; 0.95/400 KIAS</td>
<td>HALF DOWN</td>
</tr>
<tr>
<td>&gt; 1.4 Mach</td>
<td>DOWN</td>
</tr>
</tbody>
</table>
### Cruise Data: Fuel consumption and range information

<table>
<thead>
<tr>
<th>Altitude</th>
<th>Wing Tip</th>
<th>Mach Number</th>
<th>Fuel Consumption</th>
<th>Nautical miles/1000 lbs. fuel</th>
<th>Approximate Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>27,000 feet</td>
<td>UP</td>
<td>0.85 Mach</td>
<td>31,784 pounds/hour</td>
<td>16.0</td>
<td>Calculate with FOB</td>
</tr>
<tr>
<td>30,000 feet</td>
<td>UP</td>
<td>0.93 Mach</td>
<td>47,300 pounds/hour</td>
<td>11.6</td>
<td>Calculate with FOB</td>
</tr>
<tr>
<td>75,000 feet</td>
<td>DOWN</td>
<td>2.7 Mach</td>
<td>55,200 pounds/hour</td>
<td>28.5</td>
<td>Calculate with FOB</td>
</tr>
<tr>
<td>75,000 feet</td>
<td>DOWN</td>
<td>3.0 Mach</td>
<td>114,100 pounds/hour</td>
<td>15.1</td>
<td>Calculate with FOB</td>
</tr>
</tbody>
</table>

### Cruise Data: Engine Performance (may vary slightly with flight conditions)

<table>
<thead>
<tr>
<th>Altitude</th>
<th>ECU/Tooltip Index*</th>
<th>KTAS</th>
<th>Mach #</th>
<th>KIAS</th>
<th>% RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>27,000 feet</td>
<td>38/27%</td>
<td>508</td>
<td>0.85</td>
<td>358</td>
<td>89.80</td>
</tr>
<tr>
<td>30,000 feet</td>
<td>45/35%</td>
<td>548</td>
<td>0.93</td>
<td>370</td>
<td>100.00</td>
</tr>
<tr>
<td>75,000 feet</td>
<td>56/50%</td>
<td>1547</td>
<td>2.7</td>
<td>372</td>
<td>101.40</td>
</tr>
<tr>
<td>75,000 feet</td>
<td>85/81%</td>
<td>1721</td>
<td>3.0</td>
<td>418</td>
<td>104.30</td>
</tr>
</tbody>
</table>

*The first number is the index mark on the ECU; the second number is the corresponding percentage of throttle displayed when using the mouse to view the throttle position tooltip.

**Legend**

- **Optimal Cruise**
- **Normal Cruise**
- **Maximum Range**
- **Maximum Cruise**
Notes on Cruising in Flight Simulator

Flight Simulator is limited in the degree to which aircraft weight will affect cruise performance. Weight has a very small, mostly negligible effect on fuel consumption and range. Thus, the cruise weight selected will have very little effect on the aircraft's range and performance. However, all other cruise performance parameters are a very close match to the real aircraft. For example, at the optimal cruise for maximum range (see the actual charts from the XB-70 flight manual below), the specified range at 27,000 feet at 68 percent of military thrust at a speed of 0.85 Mach is 16 nautical miles/1000 pounds of fuel, achieved by setting the throttles to 38 percent using the ECU index marks (27 percent using the mouse tooltip). Your Virtavia XB-70 Valkyrie will match this performance exactly, the only variation being that aircraft weight will not materially affect cruise performance. Likewise, setting the throttles to maximum military thrust (45 percent on the ECU, 35 percent using the mouse tooltip) at an altitude of 30,000 feet will yield a fuel economy of 11.6 nm/1000 pounds of fuel, again, an exact match for the real aircraft.

The variation in supersonic cruise also reflects that of the actual aircraft, except with respect to weight. A cruise of 3.0 Mach at 75,000 feet will result in a specific fuel consumption of 15.1 nm/1000 pounds, while backing the throttles down to minimum afterburner at the same altitude will result in a specific fuel consumption of 28.5 nautical miles per 1000 pounds of fuel.

The chart information for percentage of either military or maximum thrust versus throttle index position will vary with conditions but is a good yardstick. Set throttles as needed to achieve the Mach number and fuel flow for the desired cruise performance. Use the fuel flow totalizer to set the throttles and then fine-tune from there.
Cruise performance in FS remains fairly constant with weight. Range will be about the same for any weight, at MIL power. 400,000 lbs is a "yardstick" weight.
Measurement of weight has a negligible effect on cruise in Flight Simulator.
Cruise performance in FS remains fairly constant with weight. Range will be about the same for any normal weight. Range information is for 340,000 lbs gross weight.
Descent

1. Descend at 450 KIAS maximum with throttles at IDLE for maximum rate of descent.
2. Set throttles to IDLE for maximum deceleration.
3. Set descent rate and speed per flight requirements if maximum rate is not needed.

Landing (350,000 lbs.)

1. Adjust speeds up or down if weight is higher or lower than 350,000 lbs.
2. Flare speed is 160 KIAS at this weight.
3. Approach the field at about 300 knots IAS with plenty of room to slow down.
4. Extend landing gear to assist with slowing below 275 KIAS.
5. Extend canard flap below 270 knots IAS. Use the switch on the 2D panel for this, or use the spoiler key to toggle the canard flap.
6. Downwind airspeed is flare + 50 = 210 KIAS.
7. Base leg airspeed is flare speed + 30 = 190 KIAS.
8. Final approach is flare speed + 10 = 170 KIAS.
9. Over airfield boundary speed should be 170 knots IAS.
10. Touch down at about 155 knots IAS. The flare is almost non-existent as the ground effect is significant. If the flare is not executed perfectly, some nose-down stick may be needed to prevent ballooning in ground effect.
11. After touchdown hold nose off as long as possible.
12. Brake as necessary after nosewheel touches down.
13. This model does not feature a drag chute; it should not be needed if a runway of sufficient length is used.

Virtavia XB-70A Valkyrie™ – DTG Steam Edition
Manual Version 1