

# Blackbird Virtual - Missions



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*Do not use this document for real life aviation purposes! For recreational Flight simulator use only.*

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# 1. Introduction

The SR-71 is an aircraft that even now, over fifty years after its creation, presents a class of its own. Today, it is no longer in use, but during the Cold War, the Blackbird flew missions all over the globe, providing intelligence deemed vital for US and world security. Its Mach 3+ flight, futuristic shape and black appearance gained it the nickname "Habu" (a viper from the Orient), an association that stuck to the type until its final operational days.

This document describes the Simwings.nl SR-71 missions created in FS2004. All material in this document is meant for recreational, simulated flight using Microsoft's Flight Simulator program.

As for the aircraft to be used, please see chapter 8. I will not propagate preference for any given MSFS-compatible SR-71, as it is my opinion that every flight simmer has his/her own preferences in that field.

**As stated on the website, all missions in this document assume prior flight simulation experience (notably with jet aircraft) on your part. There are no basic flight instructions included.**

Have fun!

*Marcel Hendrikse*

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## 2. Mission profile overview

The missions that can be flown, are all coded based on their contents/aims. BB means "Blackbird", the following character and other abbreviations are explained in the overview below.

### Mission descriptions

BB1	Training: SR-71 from Beale AFB
BB1A	T-38 used for jet flight proficiency (see <a href="http://www.simwings.nl/ace/ace2.pdf">http://www.simwings.nl/ace/ace2.pdf</a> )
BBT	Transfer from Beale to Kadena or Mildenhall
BBR	Return from Kadena/Mildenhall to Beale
FCF	Functional Check flight (from any station)
BB2	Operational missions from Kadena AB
BB3	Operational missions from Mildenhall AB
BBP	Ferry between operational station and Palmdale (KPMD)

**BB2 Operational Areas:** Border areas of: North Korea/North Vietnam/Eastern Russia/China

**BB3 Operational Areas:** Border areas of: North Africa/Northern Russia (Murmansk)/Western Russia

### 2.1 Mission profile – BB1

- Take off
- Subsonic flight profile maneuvering (30/45 degree AOB turns left and right, track VOR, use of A/P elements)
- Operational envelope: climb to FL750 and accelerate Mach 2.8-3.0
- Operational envelope: heading changes (time consuming due to speed!), manual and via A/P
- Deceleration/Descend & turn toward heading for returning to base
- Navigate back to base
- Touch and go's, followed by full stop landing for landing practice

### 2.2 Mission profile – BB2/BB3

- Choose target: airfield/city/bridge(s)
- Take off, light fuel load, activate ArrestorCables, set 1200 GPM fuel transfer rate
- Climb to FL250, set speed to 250KIAS and refuel (SHIFT+F5) until required fuel load has been reached (simulate aerial refueling)
- Climb to 80,000 feet, accelerating to Mach 3.2/3.3 and head for target area
- Photograph intended target and proceed out of the area
- Descent to FL250, refuel again
- Climb back to cruise altitude and speed (FL800/M3.2-3.3)

## 2.3 Mission profile – BBT/BBR

Take off, light fuel load, activate ArrestorCables, set 1200 GPM fuel transfer rate  
Climb to FL250, set speed to 250KIAS and refuel (SHIFT+F5) until full fuel (simulate aerial refueling)  
Climb to 80,000 feet, accelerating to Mach 3.2/3.3 and head directly for destination base  
Initiate decel and descent at 150-120 miles from destination  
Land at destination

## 2.4 Mission profile – FCF

Takeoff, light/medium fuel load, activate ArrestorCables, set 1200 GPM fuel transfer rate

FCF-1: FL250, MIL power, register

- AOA/KIAS/indicated ALT/indicated Mach
- Per engine: RPM/EGT/FF/Pressure/fuel quantity

FCF-2: FL250, M0.85 (330-350 KIAS), test

- Yaw left and right 5 degrees per direction
- While in turn, activate HEADING HOLD A/P, monitor heading capture
- Engage and test MACH HOLD A/P (M0.85)
- Set 45 degree AOB, register G-meter (~1.4) & AOA

FCF-3: FL250, aerial refueling

FCF-4: Mach 3.0

- Accelerate to Mach 3.0, climb to FL80
- Register KIAS/Altitude/Mach/AOA
- PER ENGINE: EGT/RPM/FF/Pressure
- A/P: checking HDG HOLD/ATT HOLD

FCF-5: Mach 2.8

- Descent, check FUEL DUMP (SHIFT+F6) shortly
- FL200-250, subsonic, check FUEL DUMP (SHIFT+F6) shortly
- 250 KIAS: check manual extension of landing gear (CTRL+G) and time to retract
- 250 KIAS: check normal extension of landing gear (G/assigned joystick control) and time to retract

FCF-6: Approach and landing. Shutdown engines and systems

- Note FUEL QTY remaining
- Set all A/P settings to 0/neutral
- Set trim to neutral
- Shutdown engines
- Shutdown GEN/BATT/AVIONICS

Chapters 3 and further will discuss these various mission profiles in more detail.

### 3. Mission profile BB1: Aircraft & Training

Welcome to Beale AFB. Building on the jet aircraft experience you're hopefully bringing with you, you will be introduced to the legendary Lockheed SR-71 Blackbird. In order to gain type-experience, you will be going through a step-by-step flight that takes you from the parking spot to the near-space realms of the sky and back to the parking spot.

First of all: the aircraft. There are many SR-71's available for FS2004 on Flightsim.com. If you are opting for the freeware Alphasim version, make sure you also install the available updates, as the basic model is not very realistic (once you retract the inlet spike one notch, the aircraft will be able to reach Mach 3 at any given altitude and within a very short amount of time...).

Make sure you are positioned at a parking spot at Beale AFB and have set **real life** weather conditions. Start up the engines, perform all checks and request permission to taxi to the active runway.

While taxiing to the holding point, make sure you set the GPS for KBAB (Beale) so that no matter where you are in the mission, you have a bearing back to base.

**Review reference values for your selected SR-71!** You should be aware of values like maximum gear operating speed, maximum gear extension speed, V1, Vr, V2, etc.

As for landing speeds, take a look at this overview, taken from the original manual at <http://www.sr-71.org/blackbird/manual/>:

<b>NORMAL LANDING SPEED SCHEDULES</b>			
<b>Approx Fuel Remaining</b>	<b>Final Approach <u>KIAS</u></b>	<b>Landing Speed <u>KIAS</u></b>	<b>Max Sink Rate Allowable</b>
10,000 lb or less	175	155	10 fps (600 fpm)
20,000 lb	185	165	9 fps (540 fpm)
25,000 lb	190	170	8.7 fps (522 fpm)
30,000 lb	195	175	8.5 fps (510 fpm)
40,000 lb	205	185	7.75 fps (465 fpm)
<b>With over 40,000 lb remaining, observe Section V landing sink rate limits.</b>			

Ok. So back to our training flight.

When you arrive at the holding point, carry out the last tests and request permission to takeoff.

First order of business is to smoothly accelerate down the runway, rotate at about 170 knots and start a smooth climb (300-400 knots) to FL250. Once there, stabilize your speed at Mach 0.80.

Activate the autopilot altitude hold for 25000 feet. Now make a couple of turns, 20, 30 and 45 degrees angle-of-bank to the left and to the right. Note that while turning, the G-forces increase. At 45 degrees, you should have a G-reading of about **1.4** in this speed envelope.

Now test the autopilot. Set a VOR station and have the autopilot track a radial of your choice.

Once you have passed the VOR station, turn toward the Pacific coast. Disengage the autopilot and increase power. Raise the nose of the aircraft and climb to FL750. Control your airspeed: make sure you do not pass Mach 2.0 prior to crossing FL600!

Once you've arrived at FL750, accelerate the aircraft to Mach 2.8 and try to hold that value for a couple of minutes. Then accelerate further to Mach 3.0 and hold. **The speed difference is little: this step is to get you acquainted with the aircraft's response to minute power changes within its operational flight envelope.**

**Do not exceed Mach number 3.2.** After holding this speed for about 5 minutes, start a slight deceleration toward Mach 2.5. At the same time, initiate a turn directly back toward Beale AFB. Use your GPS gauge to determine direction and distance.

The turn you have just started, will be a very, very wide one due to the fact that you are traveling at a very high speed. Look at the distance designator when you level off, heading straight for Beale. You can now opt to keep about Mach 2.5 or re-accelerate back to Mach 3.0. Once you pass the 100 Nm distance mark from Beale, set your throttle to idle.

Decelerate gradually and start cycling the inlet spikes using F6 when below Mach 2. Adjust engine power to counter-act drastic speed losses.

Your descent path should take you near Beale AFB (within 20 miles), flying subsonic, at an altitude between 2500-4000 feet **AGL**.

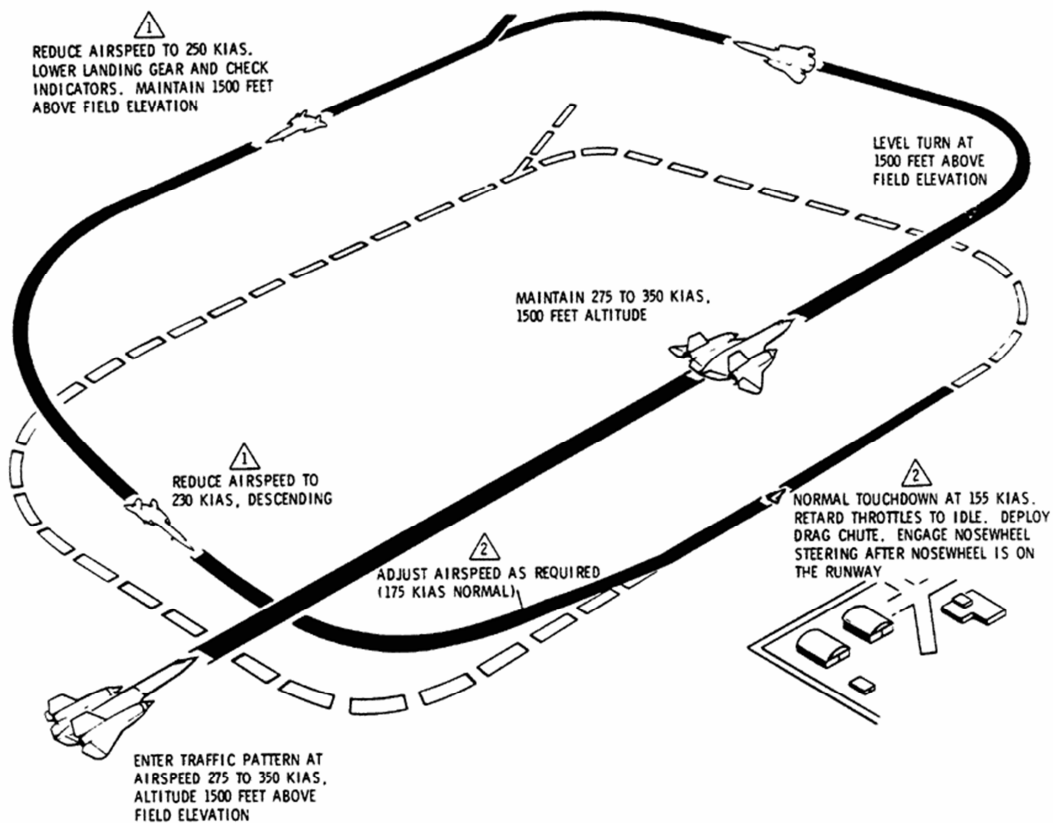
## **FIRST APPROACH: TOUCH AND GO**

We are going to make this one a touch and go.

Line up with the active runway, check your fuel quantity and adjust for correct speed and pattern altitude, according to the reference table on the previous page.

**For the landing pattern overview, refer to the diagram on the next page**

**LANDING PATTERN - Typical**



**NOTE**

- ⚠ For aircraft over 100,000 lbs. (more than 40,000 lb. fuel remaining), maintain 275 KIAS on downwind leg and 250 KIAS on base leg; and use an angle of attack of approximately 10.5° for final approach and landing.
- ⚠ Increase normal speed for final approach (175 KIAS) and landing (155 KIAS) by 1 knot per 1000 lb of fuel over 10,000 lb remaining. For maximum performance, the minimum landing speed is 10 KIAS less than the speed determined by this rule. See Appendix figure A2-15. The minimum final approach speed is 20 KIAS above the intended landing speed.

FZC-21-4

**Figure 2-16**

Once you are overflying the main runway, contact Beale tower and request a touch and go. Follow the path in the diagram on the previous page and carry out the touch and go. You can repeat this a couple

of times (recommended) to get a feel for the aircraft in landing configuration and at approach and landing speeds.

## LAST APPROACH: LANDING

Upon the last touch and go touchdown, add power, take off and retract gear. Then climb to 1500 feet **AGL**. *Do not exceed 300 KIAS!* **Make sure you request permission for a full-stop landing!**

Again follow the displayed flight path, this time coming to a full stop after having touched down.

Taxi back to the parking and shut down systems and engines.

### **ON-TYPE EXPERIENCE ADVICE**

In order to gain more of a 'feeling' for the aircraft, you can repeat this mission (preferably at least one as a **night** flight as well!) as often as you want, ending each flight with 2-3 touch and go's in order to gain some on-type landing experience.

## 3A. Mission profile BB1A: T-38 used for jet flight proficiency

In real life, SR-71 pilots would keep up their jet flying skills by using T-38's attached to their squadron. The sheer preparations for and complexity of SR-71 flights rendered the type not usable for type proficiency training. Specific SR-71 procedures were normally trained using the flight simulator installed at Beale AFB, while real life jet experience was 'polished' by means of the T-38's.

For T-38 training, I refer to <http://www.simwings.nl/ace/ace2.pdf> , where I have described FS T-38 flying in more detail.

Generally, I'd advise you to train yourself in the T-38 by practicing touch and go's, aerobatics and amassing flight hours flying from Beale to various airbases or civil airports. Once there, practice one or two touch and go's, land, refuel and take a break before either travelling back to Beale or on to another destination.

## 4. Mission profile BB2/BB3: Operational reconnaissance

BB2/BB3 will take you to the borders of the world's "hot areas". You will fly along a border, peeking into the country you have targeted, creating screenshots of bridges/airfields/cities.

**BB2/BB3 missions are preceded by your transfer flight from Beale to either Mildenhall or Kadena.** Once that has been completed, you can start planning your recon mission. Deployments like this were usually short, so in general you can simulate that by going to either airbase, fly 3-4 recon missions from there, then return to Beale, or combine your leaving with a visit to Palmdale (BBP, see next pages).

What do you need? **ArrestorCables** to simulate refueling and a screenshot utility like **GameCam** or **Frap**s that will allow you to make many screenshots in rapid succession while using flight simulator.

**General flight profile:** takeoff with about 20% of fuel aboard, go to FL250 (or thereabout) and get into close formation with an airliner, starting SHIFT+F5 to take in fuel and load up your plane to 100% fuel load (*disable crash detection!!*). Then climb to FL800, set course to the target area and accelerate to Mach 3.0-3.2.

**Target area:** usually the SR-71 stayed at the borders of the country it was photographing. For flightsim purposes I'd say "just go in there and use any path you like to your target".

Needless to say that prior to starting a BB2/BB3 mission, you should determine your target by for instance using the slew function to take a close look at potential targets. Include the target in your flight plan (another recommended program to have is **FSNavigator**).

**After having made the 'photo's' of the target (area),** set course for your base. Check your fuel. You will most probably have to get some fuel in order to be able to return to base. This means you will have to decelerate in the direction of your base, at the same time descending to an altitude where airliners are flying. Hook up with one and use the ArrestorCables module to refuel. You will probably not have to get a full tank this time; just enough to make it back and be light enough to land. Depending on the distance to the base, you can climb up to FL600 and above and accelerate back to Mach 2.0+.

**Camera considerations:** you can fly directly over your target and make top down pictures of it. Or you can fly in the near vicinity and make what is called an oblique picture. From the virtual cockpit you can set your eye point to even outside the aircraft (with SHIFT+BACKSPACE/SHIFT+ENTER) and use the panning button on your joystick to look directly at the target, zoom in and press the screenshot hotkey for the screenshot program you are using.

**Mission length and aircraft performance:** Of course recon missions of this type can be quite time-consuming, despite the fact that the Blackbird travels fast. So keep that in mind while planning your missions. As for aircraft performance, you must be prepared for the fact that once you have refueled the Blackbird, the weight of the aircraft has increased substantially. It will take longer to accelerate to the mission speed of Mach 3. While burning fuel, the aircraft becomes lighter and the speed will gradually increase. Make sure you never exceed Mach 3.2(0)!

## 5. Mission profile BBT/BBR: Transfer & return

Prior to flying operational reconnaissance missions, you will most probably have to move from Beale toward one of the Detachments overseas. These detachments are stationed in the UK, at RAF Mildenhall (Detachment 4) and in Japan, at Kadena AFB (Detachment 1).

The "BBT" mission profile has you fly your SR-71A from Beale to either of these bases. From there, you will follow the BB2/BB3 mission profiles into your target zone.

The general steps are the ones described on page 5:

- Take off, light fuel load, activate ArrestorCables, set 1200 GPM fuel transfer rate
- Climb to FL250, set speed to 250KIAS and refuel (SHIFT+F5) until full fuel (simulate aerial refuelling)
- Climb to 80,000 feet, accelerating to Mach 3.2/3.3 and head directly for destination base
- Initiate decel and descent at 150-120 miles from destination
- Land at destination

The second step gets more realistic if you manage to maneuver your Blackbird into close formation with an airliner for the duration of the refueling process!

**Set the sim to ignore crashes in order to allow yourself to get really close to the AI aircraft.**

**Of course, make sure you have scenery installed for Kadena, Mildenhall and Beale**

## 6. Mission profile FCF: Functional Check Flight

The Functional Check Flight, or FCF, is a flight that is carried out following large-scale aircraft maintenance. For the SR-71 this involved carrying out checks at medium altitude and speed, as well as in the operational envelope: Mach 3 at FL800 (or thereabout).

I have used the *SR-71-6CF-1* manual from [sr-71.org](http://sr-71.org) and attempted to dial it back to Flightsim standards/capabilities as much as possible.

**Takeoff with 17% of fuel and join on AI airliner. Use ArrestorCables program to simulate refueling**

<b>FCF-1: FL250, MIL power, register</b>	AOA KIAS Indicated altitude Indicated Mach #
<b>FCF-2: FL250, M0.85 (330-350 KIAS), test</b>	Yaw left and right 5 degrees per direction
	While in turn, activate HEADING HOLD A/P, monitor heading capture
	Engage and test MACH HOLD A/P (M0.85)
	Set 45 degree AOB, register G-meter (~1.4) & AOA
<b>FCF-3: FL250, aerial refueling</b>	<b>Join on airliner and refuel</b>
<b>FCF-4: Mach 3.0</b>	Accelerate to Mach 3.0, climb to FL80
	Register KIAS/Altitude/Mach/AOA
	<p style="text-align: center;"><u><b>L-engine</b></u>      <u><b>R-engine</b></u></p> EGT RPM FF Pressure
	A/P: checking HDG HOLD/ATT HOLD
<b>FCF-5: Mach 2.8 (<i>toward base!</i>)</b>	Descent, check FUEL DUMP (SHIFT+F6) shortly
	FL200-250, subsonic, check FUEL DUMP (SHIFT+F6) shortly
	250 KIAS: check manual extension of landing gear (CTRL+G) and time to retract
	250 KIAS: check normal extension of landing gear (G/assigned joystick control) and time to retract
	Continue descent and deceleration
<b>FCF (Continued)</b>	

<b>FCF-6: Approach and landing. Shutdown engines and systems</b>	Note FUEL QTY remaining
	Set all A/P settings to 0/neutral
	Set trim to neutral
	Shutdown engines
	Shutdown GEN/BATT/AVIONICS

## 7. Mission profile BBP: Palmdale operations

This mission profile simulates a flight from or to Palmdale (KPMD), near Edwards AFB in California, where the Lockheed Skunk Works were situated. Your SR-71 has been in need of a major change or overhaul that only the manufacturer can/may carry out.

You can fly BBP in three different ways.

First, you can fly to Palmdale, save the situation and return to base later on (the TO/FROM option, the most complete one of the three).

You can also just fly from your base (usually Beale AFB) to Palmdale and leave it at that (the TO option).

Or you can simulate having been sent to Palmdale to pick up a (modified) Blackbird by only flying from there back to Beale or your assigned duty station (the FROM option).

Create a flight plan. I usually prefer "GPS Direct" at FL600 in order to prevent having to change course all the time and allowing the liberty to cruise at somewhere between Mach 2.0 and 2.8. This requires solid anticipation when it comes to planning the descent!

If you plan to go back to Beale, you might consider carrying out a Function Check Flight from KPMD first and then fly back to Beale later on (or the next day).

## 8. Software: downloads & recommendations

First, I will list the software I have used to create this document. This overview will **NOT** include the SR-71 aircraft itself! There are freeware and payware versions of the SR-71 available and the choice as to which version you use, is completely yours.

### **Scenery:**

- Palmdale, AF plant 42 (near Edwards AFB)
- Beale AFB
- Mildenhall AB
- Kadena AFB

### **Aircraft *other than SR-71*:**

- FSD T-38 and updates to panel/aircraft/sound
- Beale repaint (tail code BB, black/red livery combination)

### **Additional resources:**

- ArrestorCables for refueling capability
- FSNavigator
- Fraps/GameCam for easy screenshotting

### **I found most of this stuff on:**

- <http://www.flightsim.com/vbfs/content.php>
- <http://www.owlstnest.eu/maiw.php>
- <http://www.freewarescenery.com/fs2004.html>
- Online FS-related stores