

NASSP Quick Start Guide

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Installation (NASSP 8.0/Orbiter 2016 Beta r90):

Prerequisites:

- **Latest Orbiter 2016 Beta** NASSP 8.0 is not compatible with Orbiter 2010 or Orbiter 2016 and is at this time only compatible with the latest Beta release of Orbiter 2016 Beta R90 which includes a crucial fix to docked spacecraft physics which is not in the release version. NASSP 8.0 is also not compatible with Orbiter 2024 or Open Orbiter releases. NASSP 9.0 development will be released for those versions.

- Microsoft VS C++ 2017 Redistributable (x86) Package if it's not installed already. <https://support.microsoft.com/en-ca/help/2977003/the-latest-supported-visual-c-downloads>

- A recent Microsoft DirectX Runtime, for example by using the Microsoft DirectX End-User Runtime Web Installer: <https://www.microsoft.com/en-us/download/details.aspx?id=35>

Download Orbiter:

We recommend using the snapshot of Orbiter 2016 Beta R90 here: <https://www.orbithangar.com/showAddon.php?id=4f300319-5ee2-4c48-a213-50995a480e06> and extract the zip to your desired install folder.

Note: As of July 2021, Orbiter has become open source and further development has moved to GitHub. The above link is to install the last SVN snapshot, which is R90.

Download Textures:

1a. Download Orbiter 2016 Release here: <https://www.orbiter-forum.com/resources/orbiter-2016-core-zip-edition.5425/> and extract the textures folder into your orbiter root. This contains only Low Res textures

1b. Optionally you may instead download the Low Res and Landing Site Textures [here](#). Extract the Textures folder in the Low Res and LS textures zips into the orbiter root

Optional: Download high-resolution Earth & Moon textures under "Optional high-resolution texture download": <https://www.orbiter-forum.com/resources/orbiter-2016-high-resolution-texture-packs.5676/> and copy to your Textures/Earth and Textures/Moon folders respectively.

Optional: Download the surface micro textures here: <https://www.orbiter-forum.com/resources/d3d9-microtexture-pack.5496/> Scroll down to "MicroTexture Pack for D3D9Client" and unzip to your Orbiter directory.

Optional: Download "Apollo Landing Sites for Orbiter 2016" by ggalfi here: <http://absimp.org/orbitersim/apollolandingsites.html> and unzip to your Orbiter directory.

The scenery is breathtaking but be aware there can sometimes be a mismatch between the visible terrain and the physical terrain in the Orbiter engine, so the LM can sometimes be floating above or sunken into the surface after landing. If you try and land exactly at the historical landing site, the mismatch should be minimal.

Note: The high-resolution textures and micro textures are optional but really add to the visual experience. Alternatively, they are also available [here](#)

3. Install D3D9Client:

- Go to <https://www.orbiter-forum.com/resources/d3d9-for-orbiter-beta.5495/> to get the latest version of the client for Orbiter 2016 Beta R90.

- Download and unzip the client file to your Orbiter installation folder.

- Start Orbiter_ng.exe (NOT Orbiter.exe) from your Orbiter installation folder. Go to the "Modules" tab and activate the "D3D9Client" module. The "Video" tab appears, configure the video settings as you like, they are quite similar to the usual Orbiter video settings. It is recommended to use "Full Screen Window" mode.

IMPORTANT: Click "Advanced" and add a check beside "Enable absolute animation handling" to prevent animation drift from happening in certain cases in the VC. You can also configure the other options on that page to your liking. We also recommend Reflection Mode "Full Scene" to get the best out of the CM's reflective texture.

4. Install XRSound 2.0: <https://www.orbiter-forum.com/resources/xrsound-official.5455/>

5. Finally, download the latest build of NASSP 8.0 at this link: <https://github.com/orbiternassp/NASSP/releases> and unzip to your Orbiter directory. Do the same with the small XRSound config zip file that can be found at the link as well. These files only must be downloaded once. They are not part of the main NASSP build so that personalized changes can be made to the sound configuration, without being overwritten by a later NASSP build.

Configure Project Apollo For Orbiter 2016 Beta:

1. Start Orbiter, go to the "Parameters" tab and make sure that at least Complex flight model, Limited fuel and Nonspherical gravity sources are enabled. Note: At this time, it is recommended to leave "Gravity-gradient torque" and "Atmospheric wind effects" disabled as on some occasions they can cause CTDs with NASSP. Go to "Visual effects" tab and configure to your liking. Make sure to have a check on surface elevation, using

LINEAR interpolation to not have the landed LM seem sunken into/floating over the lunar terrain. You can also check "Particle streams" to see the various particle/dust effects in NASSP and "Local light sources" for the night-time launch pad lighting.

2. Go to the "Modules" tab and activate the "XRSound" and "ProjectApolloMFD" and "ApolloRTCCMFD" modules.

3. Go to the Vessel Configuration->Project Apollo Configuration on the "Extra" tab. If you have a joystick, this is where you can configure your joystick for use in NASSP. Do not use the normal Orbiter controls page to configure your joystick, there it should be <Disabled>. In the "Miscellaneous" tab, make sure "Multi-Threading in time acceleration" is checked. It is also recommended to set a limit for time acceleration, NASSP runs best at 50x or less depending on the hardware you are using.

How to update NASSP 8.0:

Download the latest build of NASSP 8.0 at this link: <https://github.com/orbiternassp/NASSP/releases> and unzip to your Orbiter directory. (Click yes to overwrite files)

Please note, timestamped saves (i.e. those within the "Apollo Mission Scenarios" folder) may not have the latest systems updates. Because of this, they may have alarms and other quirks when loading them. We encourage starting with a fresh launch.

Installation (NASSP 9.0/Orbiter 2024+):

Download Orbiter:

1. Download Orbiter 2024 x64 or the latest Open Orbiter development release x64 from [Orbiter GitHub](#) or optionally a build from [OneDrive](#)
2. Extract the Orbiter 2024 or Open Orbiter x64 into a folder of your choosing, this will become the orbiter root

Download Textures:

- 1a. Download Orbiter 2024 Release CDN [here](#) and extract the textures folder into your orbiter root. This contains only Low Res textures
- 1b. Optionally you may instead download the Low Res and Landing Site Textures [here](#). Extract the Textures folder in the Low Res and LS textures zips into the orbiter root
2. If you choose to download all the high-res textures [here](#), make sure you have the folder organization correct (Earth/Archive and Moon/Archive) and put those into the Textures folder of your orbiter root. **Please note that you need to download the individual high-res files from drive and not the folders, otherwise incorrect filenames will be appended**

Download NASSP:

1. Download the latest NASSP Release or Pre-Release from [GitHub](#)
2. Extract NASSP into your orbiter root
3. Launch orbiter and go to the "Modules" tab and activate the "ExtMFD", XRSound", "ProjectApolloMFD" and "ApolloRTCCMFD" modules. Do not use the DX9MFD as it is known to cause crashes
4. In Options->Visual Settings make sure "local light sources" is enabled, enable surface elevation, using LINEAR interpolation to not have the landed LM seem sunken into/floating over the lunar terrain. You can also check "Particle streams" to see the various particle/dust effects in NASSP and configure the rest how you wish
5. In Options->Physics Settings, leave all enabled except atmospheric wind effects.
6. In Video, make sure you select D3D9Client as the graphics engine and then select your GPU, and we encourage using "full screen window." Laptop users may have to use their GPU software/windows top force orbiter to see their dedicated GPU
7. In the advanced settings of video, configure however you wish, but you must have "enable absolute animation handling" checked and texture mipmaps must be set to "load as defined." Additionally, set reflection mode to "full scene" to get the most out of the CM textures

8. In Extra->debugging options->orbiter shutdown options, we recommend setting it to terminate orbiter process to prevent multiple instances of orbiter from launching causing problems

9. In Extra->vessel configuration->project apollo configuration, make sure mesh is set to high resolution, FDI is on smooth scrolling, and on the miscellaneous tab, check multi-threading in time acceleration. You can optionally choose to limit max acceleration (useful to not “over warp”) and a debug line that appears in the LPD view in the virtual cockpit that displays landing information that would normally be called out by the LMP

Tips For Beginners:

What mission(s) should you start with?

That's ultimately up to you, but we generally recommend Apollo 8. While Apollo 7 is chronologically first, it's a very long mission that is meant to test vehicle systems and procedures from the relative safety of low Earth orbit. As such, it involves a very unusual and often repetitive schedule, with procedures that are rather unrefined. Apollo 8, by contrast, is a relatively short mission with more straightforward goals and mission design. You get to experience most of the lunar mission milestones without needing to worry about managing two separate vehicles on your first journey. After Apollo 8 concludes, Apollo 11 or 12 would be our next recommendation. You get to use the LM and land on the moon, and the procedures have been improved and optimized thanks to the lessons learned on all the previous missions.

What mission(s) might not be suitable for beginners?

We generally *do not recommend* Apollo 13-17 for beginners, since they have not yet been given automatic mission control support or mission-specific checklists, meaning you'll need to do a lot of things manually, including planning the entire mission trajectory and maneuvers via our virtual RTCC. This is its own challenge in addition to flying the mission, and we recommend you only attempt it when you feel you have adequate experience with NASSP and Apollo. Once you feel comfortable enough to give it a try, consult the documentation included for an overview of how to interact with the RTCC to perform various mission tasks.

Once you load into a fresh "Launch" scenario, you'll be presented with an external view of the Saturn launch vehicle stack. "How do I actually get into the cockpit?" you might ask. Simply press the F1 key to switch between the internal and external view.

Now that you're inside the cockpit, you'll notice it's a classic style 2D panel. While this panel works fine, we've made huge improvements to the graphical quality and immersivity of NASSP over the last few years, so we strongly recommend using the 3D cockpit whenever possible.

To switch between the 2D cockpit and the more modern 3D cockpit, press the F8 key. Also, be sure to use the lighting knobs inside each vehicle's cockpit to adjust the lights to your liking.

How do I move around the cockpit?

The 2D and 3D cockpit views are divided up into multiple viewpoints, usually centered on a specific panel or group of panels. Think of these a bit like choosing which "seat" you're positioned at in the spacecraft. In each view, you can use the arrow keys to move the camera up, down, left, and right. You can switch between these seats by holding the Control/Ctrl key and pressing an arrow key. It may take some time to get used to where each of the viewpoints are located within the cockpit. In the 3D cockpit specifically, from any "seat" you can hold Ctrl and Alt and press an arrow key to adjust the camera to one of several preset angles, to help get a better view of certain switches or components in that area. For example, from the left seat of the CM, you can press Ctrl + Alt + Right Arrow to zoom the camera in on the DSKY, or Ctrl + Alt + Left Arrow to look to your left, at the side panels near your armrest. Every "seat" has its own set of preset views, many of which are very helpful in finding switches that are out of sight or not as easily viewable.

How do I interact with switches?

Most switches can be controlled by left clicking. Click slightly above the switch to push it up, and slightly below to push it down. Some switches may have three positions, so to move the switch from its "up" position to the "down" position, you'll need to click twice. If a switch has a guard or cover, right-click the switch to open or close its cover.

How do I interact with circuit breakers and computer keys?

These are pretty easy. You can click on the left circuit breakers to close or open them. For computer keys like the DSKY or DEDA, just click on each button to press it. If you find that the computer isn't always responding to your key presses, you may be letting go of the button too quickly. Each computer key needs to be held for a small fraction of a second, and sometimes a fast click doesn't hold the button down for quite long enough. You don't need to hold them for a long time, only for a brief moment to ensure they register.

How do I interact with rheostats/knobs?

A "rheostat" is one of the gray knob-like controls. Some of these work differently than others. Certain rheostats for controlling the cockpit lighting or the S-Band antenna angles are continuous, meaning they can be rotated freely to any position. To adjust these, click and hold on the knob, and then drag left or right to adjust its position. For other rheostats with discrete positions, left-click to rotate the knob to the left, and right-click to rotate it to the right.

How do I interact with thumbwheels?

Thumbwheels are the vertical numbered controls, found on the gimbal trim control panel and the attitude set control panel. Left-click the upper or lower part of each thumbwheel to increase/decrease its value by 1, or right-click them to increase/decrease by 0.1. The dV/Range Set switch on the EMS works similarly: hold the switch on the top or bottom to increase or decrease the value and left-click or right-click to do so fast/slowly.

MFD's and things.

While the 2D cockpit has MFDs built right into its main panel, the 3D cockpit does not. To open an MFD in the 3D cockpit, move your mouse near the top of the Orbiter window. A menu bar should drop down. Click on "Function" and then choose "External MFD". If this option does not appear, make sure the "ExtMFD" module is enabled in the Orbiter settings.

When looking at the Checklist MFD, you'll notice the text has multiple colors. Green checklist entries will automatically proceed once the relevant switch, circuit breaker, button, etc. is in the correct position. Yellow entries need to be manually verified/completed and then proceeded past with the "PRO" button on the MFD. Blue entries indicate a jump to another checklist within the current one. Sometimes these happen automatically, or you may need to click "PRO" or "FAIL" to decide whether you want to activate the new checklist or skip it. To enable or disable the auto-proceed function of the checklist, click the "AUTO" button on the MFD.

If you need to navigate to another part of the current checklist being displayed, you can use the UP/DN or PG UP/PG DN buttons to temporarily move the cursor to a different entry in the checklist. Then, click "GOTO" to confirm you want to move to this new location, or "BACK" to return to the previous location.

Optics

For optics sightings, you'll need to enable the AGC star markers. To do this, move your mouse near the top of the Orbiter window. A menu bar should drop down. Choose "Options", then choose "Visual helpers > Planetarium". Make sure to enable "Planetarium mode (F9)" and then enable "Celestial markers" and ensure "Apollo AGC navigation stars" is selected. Now, you should be able to see green markers indicating the positions, ID numbers, and names of the stars that the AGC knows about. Once you've enabled the markers in the settings window, you can quickly toggle them on or off with the F9 key.

Additionally, in the "Celestial Sphere" options, you will want to ensure Background Stars are "shown as pixels" so you can better identify the point when doing optics sightings.

When you mark a star, you want to mark the center of the crosshair and not the star pixel. Orbiter's star map has current star positions where the computer is expecting the locations circa 1970, so the crosshair center represents the star's location when Apollo was flying.

For the virtual cockpit optics, to enable superimposed view, you need to click the center of the reticle in addition to using the V key.

Take screenshots of your PADs, always!

On missions with automated MCC support, you'll periodically receive Pre-Advisory Data (PAD) on the left side of the screen. Whenever you receive one of these, it's a good idea to take a screenshot of this data and save it somewhere. Each new PAD will replace the previous one, and certain parts of a mission might send you several over the course of a few minutes, so you will often need to keep track of them longer than the automated system keeps them there. Additionally, if you ever encounter problems with a burn or a trajectory calculation, sending us your PAD for that maneuver can be useful for debugging and troubleshooting.

Save frequently and keep your save files organized!

While we work hard to make sure the sim is stable and the instructions are clear, glitches and human errors can cause problems. Saving often and organizing those save files will help ensure that any issues don't result in losing hours of progress. I find it's helpful to periodically rename my latest save file to the mission time when I saved, plus a short remark about what I was doing.

Be careful with time warp!

NASSP does a lot of complex calculations in the background, and time warping too fast can cause these calculations to fail, which can cause your current simulation session to temporarily glitch or completely break. As a rule of thumb, if you notice that the simulator's framerate is dropping significantly when you use time warp, it probably means you are going too fast. We developers have moderately powerful computers, but they're far from high-end, mega-expensive machines. We can usually manage somewhere between 50x and 100x time warp at the absolute maximum.

Be careful with time warp, part 2!

If any vessel is actively maneuvering or holding attitude (attempting to rotate or remain stationary with RCS turned on), be aware that high time warp levels can cause them to waste fuel or even spin out of control. This is a limitation of how we simulate the physics of RCS, and it may happen even if your computer is able to deal with fast time warp normally. It will even affect vessels that you're not currently controlling: time warping in the CSM while the LM is trying to hold attitude will cause problems for the LM. Usually going up to about 5x or 10x is safe. If you want to time warp faster, be sure to disable any kind of attitude-hold mode in the CSM and LM before continuing but watch out to make sure you don't slowly drift into gimbal lock! This is especially important for rest periods using any control mode during PTC like Apollo 8. Just as above, on Apollo 8 SCS PTC, disabling attitude control (SC CONT – CMC and CMC MODE – FREE) is advised for rest periods or extended warp in PTC.

Remember the CSM O2 Hose.

When you're performing LM activation, be sure to use the Project Apollo MFD's "ECS" section to connect the O2 hose from the CSM. This creates a flow of fresh oxygen into the LM so that the cabin doesn't fill up with deadly CO2 and poison your crew before the LM ECS is activated. Having this O2 hose connected also prevents you from closing the CSM forward hatch, so if you can't get it too close, make sure you've disconnected the hose.

Pay attention to whether your LM crew should be in the cabin or their suits.

Some of the most common causes of sim crew death are accidents involving your LM ECS configuration. In addition to the controls in the spacecraft itself, there's also some important options in the Project Apollo MFD, in the "ECS" section. LM crew can be in the cabin (unsuited), or suits with a toggleable helmet gloves on or off option.

The checklists should steer you in the right direction, but it is easy for mistakes to happen, so be vigilant. In the future, we intend to overhaul the Command Module ECS to also simulate the crew being suited or unsuited, so getting into the habit of paying attention to this is highly recommended.

Cue cards and special click spots!

If you look carefully, you will notice there are Velcro patches around the CM and LM. Clicking these will allow you to utilize various mission cue cards, window shades, glareshields etc. that were used during flight. One caveat is they are mostly Apollo 15 cue cards currently, so keep that in mind when flying other flights. We are working to find/create more mission specific cue cards in the near future.

Keyboard Commands:

General Controls:

Important: Keyboard commands below are intended for a QWERTY keyboard. Please adjust accordingly for other keyboard layouts as the keys reflect physical positions on the keyboard. (i.e. for a QWERTZ keyboard, Z would be used in place of Y)

General Interface	
Divide (Numpad /)	Toggles Rotational and Translational inputs
TAB, 1-9	MCC CAPCOM interface
F1	Toggles External/Internal Views
F8	Toggles Internal Views; Orbiter/2D/Virtual Cockpit (3D)
Ctrl+Alt+S	Generate Mission Time-Stamped Quicksave

Virtual Cockpit	
Arrow keys	Move Left/Right/Up/Down
Insert/Delete	Move Forward/Backward
Shift	Move Slowly
F	Enable/Disable Flashlight
Ctrl+H	Toggle Cue Card Arrows

Spacecraft Rotation	
2 (Numpad)	Pitch Up
8 (Numpad)	Pitch Down
1 (Numpad)	Yaw Left
3 (Numpad)	Yaw Right
4 (Numpad)	Roll Left
6 (Numpad)	Roll Right
Alt+Numpad	Hardover

DSKY	
Shift+Decimal (Numpad)	DSKY Clear
Shift+Page Up	DSKY Reset
Shift+Home	DSKY Key Release
Shift+Enter (Numpad)	DSKY Enter
Shift+Divide (Numpad /)	DSKY Verb
Shift+Multiply (Numpad *)	DSKY Noun
Shift+Plus (Numpad +)	DSKY Plus
Shift+Minus (Numpad -)	DSKY Minus
Shift+End	DSKY Proceed
Shift+ 0-9 (Numpad)	DSKY 0-9

ORDEAL	
Alt-O	Slew ORDEAL Up
Alt-L	Slew ORDEAL Down

Command Service Module Controls:

Translation	
6 (Numpad)	+X (Forward)
9 (Numpad)	-X (Aft)
2 (Numpad)	-Z (Up)
8 (Numpad)	+Z (Down)
1 (Numpad)	-Y (Left)
3 (Numpad)	+Y (Right)

Optics	
W	Optics Up
S	Optics Down
A	Optics Left
D	Optics Right
Q	Optics Mark
E	Optics Mark Reject
V	Change Sextant View Mode to Dual View

Minimum Impulse Controller	
Shift+W	Pitch Down
Shift+S	Pitch Up
Shift+A	Yaw Left
Shift+D	Yaw Right
Shift+Q	Roll Left
Shift+E	Roll Right

Translational Hand Controller (THC)	
Minus	Rotate Counterclockwise (CCW)
Equals	Rotate Clockwise (CW)

CM Miscellaneous	
Multiply (Numpad *)	DV Thrust switches A and B to off (manual SPS cutoff)
Alt + R	Recover the crew after splashdown

Lunar Module Controls:

Translation	
6 (Numpad)	+Z (Forward)
9 (Numpad)	-Z (Aft)
2 (Numpad)	+X (Up)
8 (Numpad)	-X (Down)
1 (Numpad)	-Y (Left)
3 (Numpad)	+Y (Right)

DEDA	
Ctrl+Decimal (Numpad .)	DEDA Clear
Ctrl+Enter (Numpad)	DEDA Enter
Ctrl+Page Up	DEDA Hold
Ctrl+Multiply (Numpad *)	DEDA Read Out
Ctrl+Plus (Numpad +)	DEDA Plus
Ctrl+Minus (Numpad -)	DEDA Minus
Ctrl+ 0-9 (Numpad)	DEDA 0-9

Alignment Optical Telescope (AOT)	
A	Cycle AOT Detent Up
D	Cycle AOT Detent Down
W	AOT Reticle Up
Alt+W	AOT Reticle Up (slow rate)
S	AOT Reticle Down
Alt+S	AOT Reticle Down (slow rate)
Q	Mark X
Y	Mark Y
E	Mark Reject

Rate Of Descent (ROD) Switch	
Minus	Increase Descent Rate
Equals	Decrease Descent Rate

LM Miscellaneous	
K	Toggle PGNS mode control AUTO/ATT HOLD
M	Toggle throttle control AUTO/MAN
SHIFT+A	Abort Stage PUSH
Zero (Numpad)	Throttle Up
Decimal (Numpad)	Throttle Down
Minus (Numpad)	Toggle Engine Stop Button
Plus (Numpad)	Depress Engine Start Button
Ctrl+Alt+Numpad	ACA Out of Detent

EVA Controls:

EVA	
Numpad Rotation	Controls Look Position
Numpad Translation	Walks or Moves during EVA
E	Boards Vehicle (Standing by hatch/ladder)
F	Plant Flag
V	Deploy LRV
B	Boards/Deboards LRV (Standing by LRV)
Plus (Numpad +)	LRV Forward
Minus (Numpad -)	LRV Reverse
1 (Numpad)	Steer LRV Left
3 (Numpad)	Steer LRV Right
5 (Numpad)	Center LRV Steering
K	Deploy EASEP/ALSEP Item

EASEP Order	
CDR	Camera -> Erectable S-Band
LMP	SWC -> PSEP -> LRRR

ALSEP Order	
CDR	Erectable S-Band -> Central Station -> SWS
LMP	TV -> SWC -> RTG -> PSE -> LSM -> SIDE

Important Links:

[Orbiter GitHub](#): Contains the latest and greatest from Orbiter 2024/Open Orbiter

[NASSP GitHub](#): Latest releases from NASSP 8

[NASSP 9 Downloads](#): Latest releases from NASSP 9 (Experimental)

[NASSP Orbiter Forum](#): Latest release update descriptions and additional information

[Flight Data Files](#): Real life mission specific documents for all flights

[Virtual AGC](#): Anything you wanted to know about the Apollo Guidance Computer, plus an enormous document repository.

[NASSP Discord](#): Come say hi and ask us questions!