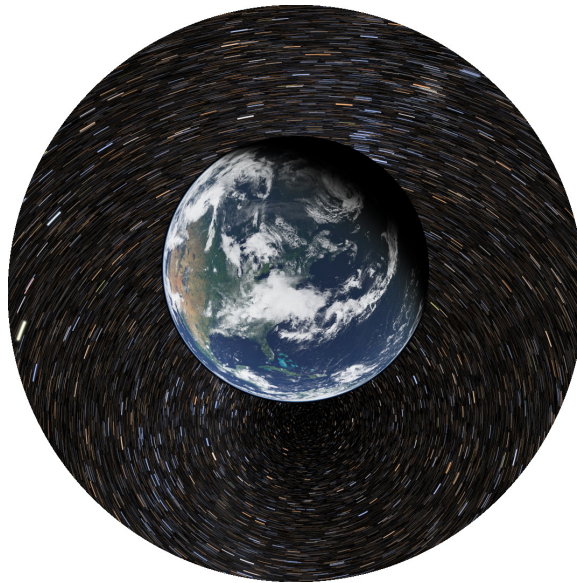# Digitarium®
# Next Generation Software
# User Manual

## For Digitarium OP5 & Newer
## Operating Platforms
## Running Nightshade® NG

Version 3.0
April 2, 2021

**Digitalis**®
EDUCATION SOLUTIONS, INC.

# Table of Contents

# Introduction

Nightshade® NG (Next Generation) is the simulation software which runs your Digitarium® digital planetarium system.  Nightshade NG is developed and maintained by Digitalis, and it should not be confused with the more limited Nightshade Legacy software which it replaces (versions 11 and lower).

Digitalis operates Nightshade NG as an open project, and encourages you to participate at: http://NightshadeSoftware.org

Nightshade NG for dome projection comes in two different editions:
- **Nightshade NG Professional** provides all the features of NG on a dome.
- **Nightshade NG Basic** is a budget edition offering fewer features.  For example, travel is limited to within the solar system only and 3D model loading is limited.

Note that due to increased hardware requirements, Nightshade NG requires at least an OP5 operating platform or newer.

If you have just downloaded a new version of this manual, remember that access to new features may require running a free Internet software update to get the latest software versions.  We recommend that you always keep your system and user manuals up to date for the latest features and bug fixes.

# Startup

When Nightshade NG starts up, it will load your "default" settings.  To change these settings, you simply make changes (for example, choosing a new location or turning cardinal points on or off) and then save your settings.  These will then be your default settings when you restart Nightshade or reload your defaults.  See Menu Mode on page 15 for one way to load or save your settings.

After loading your default settings, the system automatically runs a script called "/scripts/startup.sts" if one exists on a USB drive plugged into your Digitarium control computer. For more information about scripts, see Script Playback Mode on page 27.  A start script is the ideal way to always load your own custom landscape at startup, for example.

# Choose Your Interfaces

There are a number of interfaces to your Digitarium system, giving you the choice of whichever interface, or combination of interfaces, meets your needs for a given presentation. Each is described further on in this manual.  Your options are:

- Digitarium hand-held remote control: general purpose control.

- Gamepad control: ideal for flying around the universe.

- Universal Console control software on an iPad or other supported computer.

# Fundamental Concepts

## Anchored Object

You are always anchored to an object, also known as a home 'planet.' With Nightshade NG Professional, your anchored body can even be a nearby star. You are not limited to being on the surface of this object. It is simply your anchor point and all motion is relative to this anchor.

For example, if you are anchored to the Earth you could move 3 light years away from it. Now if you adjust your latitude, this is still relative to the Earth even though you can no longer see it.

To change your anchored object you just need to select an object and fly to it (or do the equivalent in a StratoScript™ script).

## Selected Object

You can optionally select an object of interest. Objects are selected using a selection cursor, scripts, etc. Do not confuse a selected object with your anchored object – movement is always relative to your anchored object, not your selected object. Note that you can select your anchored object if desired.

## Focal Point

Your focal point is a point on your dome where you want to focus attention so that your audience will have the best view during your shows. In a dome with unidirectional seating, this would be in front of the audience. In a concentric dome this is usually at the dome zenith.

When you track your selected object, it will move to the focal point. Zooming in with the remote control will also keep the selected object at this location. (To untrack, use the zoom out button on the remote control.) You define your focal point using the text menu, discussed in the Menu Mode section on page 15.

## Landed Mode

In Nightshade NG you are either in Landed Mode or Exploration Mode. In Landed Mode, you are on the surface of your Anchored Object, such as the Earth, looking up at the sky. You can display a photographic landscape if desired. You enter this mode by landing on an object.

## Exploration Mode

In this mode you are above the surface of your Anchored Body. You can fly around this object at whatever altitude you want. You can be near the surface exploring terrain – or fly so far away that you can not even see your Anchored Object. You can not display a photographic landscape in this mode. You enter this mode by flying to an object.

# Gamepad Control

| Backlit Style Gamepad | Xbox Gamepad (older systems) |
|---|---|
|  |  |

## Basic Control Layout

1. Left trigger: Move away from anchored body

2. Right trigger: Move closer to anchored body

3. Left bumper: Zoom out

4. Right bumper: Zoom in

5. Left stick: Move

6. "Back": Accelerate time rate backwards

7. Home/Guide button: Select the Earth

8. "Start": Accelerate time rate forwards

9. Directional pad: Cursor control

10. Right stick: Pan view

A. Select object at cursor

B. Unselect object

X. Fly to/land/take-off toggle

Y. Track selected object

Note:  Your gamepad layout may vary slightly from the illustration.  Controls 1, 2, 5, and 10 are not just on/off type controls – the rate of motion will vary with the amount that you move the control.

The backlit style gamepad has a built-in rechargeable battery.  Charge by connecting a USB-C connector to the port between buttons 1 and 2.  The gamepad does not function while charging.

To dim the backlight, hold down buttons 1 and 2 while pressing straight in on the right stick.  With these still held down, use the directional pad up and down to adjust the backlight.
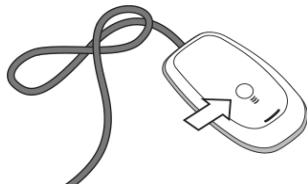
## Getting Started with a Wireless Gamepad

Your wireless gamepad controller may seem like it is not working. First make sure you have the USB receiver plugged into your Digitarium computer before you boot up.  While Nightshade is running, depress button 7. The gamepad will wake up and usually start working right away.

**On the backlit gamepad:** If the receiver is not found, the four rows of lights to the right of the directional pad will animate.  Once connected, the lights will become solid blue.  The second and third rows of the four rows of lights to the right of the directional pad should be on.  If not, hold down the Home button for five seconds to cycle between input modes.  After changing this mode you need to restart Nightshade NG for proper gamepad functioning.

**On the Xbox gamepad:**  If you can not connect, you can remove and reinsert the gamepad batteries, and try again. If this fails, pair your Xbox gamepad to the receiver again as described below.

## Pairing an Xbox Wireless Gamepad to its Receiver

| | |
|---|---|
| 1. While Nightshade is running, turn on the gamepad by depressing button 7. | |
| 2. On the receiver, press the connect button. The light flashes green. Note: The receiver may be inside your system enclosure. | |
| 3. Press the connect button on the wireless controller. | |
| 4. Green flashing lights around button 7 on the gamepad and on the receiver indicate that the device is trying to establish a connection. When the lights stop flashing and remain lit, the gamepad is connected. | *Image credits : Microsoft XBOX 360 support* |

## Specific Controls in Detail

The more complex controls are explained below.

### Left Stick – Movement

This stick controls movement.  Pushing the stick up (towards the top of the page, as shown) will move you forward.  Pushing the control to the right will move you right, etc.

In landed mode, moving forward is always North on your anchored body, right is West, etc.

In exploration mode, forward is always in the direction from your Anchored Object center towards the dome zenith, and the other directions are relative to the forward direction.

### Cursor Control

This pad controls movement of the selection cursor.  Pushing up on the pad moves the cursor up towards the zenith.  Pushing down moves the cursor towards the horizon.

If you are facing the cursor on the dome, pushing the pad left moves the cursor left.

You can select an object by positioning the cursor near it and then hitting the green A button to select it.

**Right Stick**

This stick controls your viewing direction. Pushing the stick up will cause you to look up (what you are looking at will move down).

Pushing the control to the right will cause you to turn to the right (what you are looking at will move left).

**Right Stick Depress**

Depress this stick into the gamepad and release like you would press a button to toggle between Geosynchronous Mode (where you are tied to a latitude and longitude on your anchored body) and Follow Mode (where you stay in the same relative position to your anchored body but do not rotate with daily motion).

**Left Stick Depress + Right Stick**

If you depress and hold down the left stick like a button you can simultaneously use the right stick left-right directions to rotate your view about the zenith.  This is useful for temporarily moving your anchored body around the dome in Exploration Mode.

**Fly to, Land, and Take off**

To fly to the currently selected object, hit the blue X button.  This will fly you directly to the object and stop at a good viewing distance. You will be in Exploration Mode.

If you are in Exploration Mode at the default viewing distance and want to land on your selected object, click the blue X button.  This will land you on the object and put you into Landed Mode.

If you are in Landed Mode, you can click the blue button to take off and go to the default viewing distance.  You will be in Exploration Mode.

# Digitarium Remote Control

The current Digitarium® system remote control is pictured at right.  Older versions will vary slightly.  In cases where the button icon shown in this manual does not match that on your older remote, the button functionality is the same regardless of the different icon.

There are four modes for the remote control:

- Normal operating mode: Control the sky simulation directly.

- Menu mode: Modify configuration settings using a text menu.

- Script playback mode: Play prerecorded segments or shows.

- Media mode: Display images or video.

The following pages will explain in detail what the buttons do in each mode.

For best reception, point the remote toward the zenith while sending commands. The infrared (IR) signals will bounce off the dome and reach the receiver on top of the system. If you are using an external IR receiver, point the remote directly at the receiver. An external receiver may be required in domes over approximately 30 feet (9m) in diameter.

The remote control is backlit. To backlight the remote for a few seconds, push the ⌁ button. You can hold down the ⌁ button, but you must release it before you push another button.
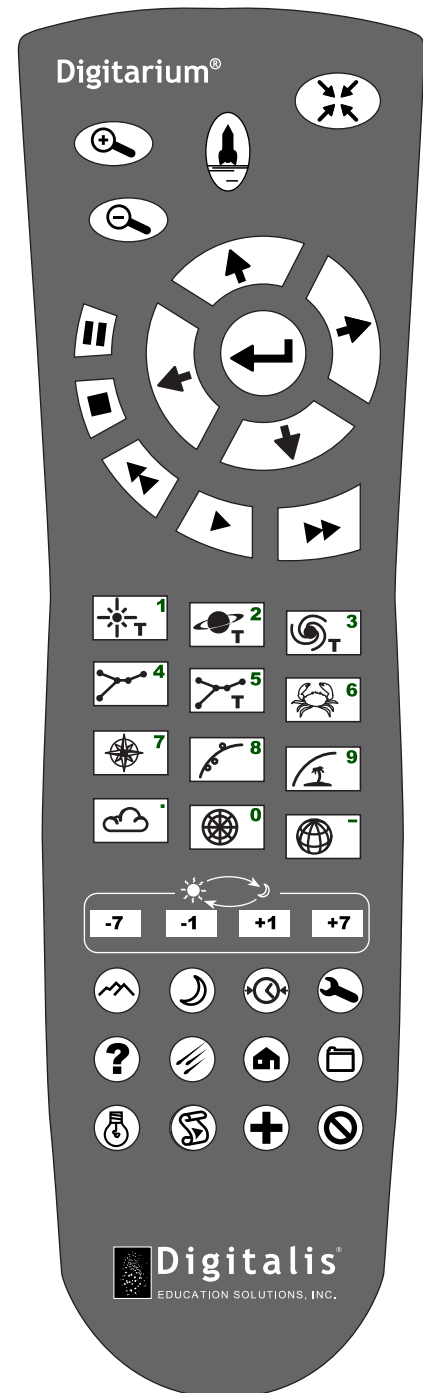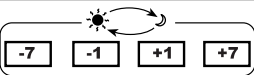
# Normal Operating Mode

In normal operating mode, the buttons do what is shown by the icons on their faces.

| Button | Normal Operating Mode Function |
|---|---|
|  | Zoom in on selected object. |
|  | Zoom out to full sky. |
|  | This is the same as the blue 'X' button on the gamepad. See "Fly to, Land, and Take-off" on page 8. |
|  | Toggle tracking (centering view on) selected object at your Focal Point. |
|  | Move cursor toward zenith. |
|  | Move cursor counterclockwise around the zenith. |
|  | Move cursor toward horizon. |
|  | Move cursor clockwise around the zenith. |
|  | Select an object located near the cursor. |
|  | Pause/continue movement of time. |
|  | Stop time. |
|  | Accelerate time rate in a negative (backward) direction. Can be pressed multiple times for faster rates. If the time rate is positive, this will act to decrease your time rate. |

| Button | Normal Operating Mode Function |
|---|---|
| | Move forward in real time. |
| | Accelerate time rate in a positive (forward) direction. Can be pressed multiple times for faster rates. If time is moving backward, will reduce the backward rate. |
| | Toggle labels for bright stars, including the Sun. |
| | Toggle body labels. |
| | Toggle labels for deep sky objects. |
| | Toggle constellation line drawings. To show one constellation at a time, select a star in the constellation you wish to show. You can add line drawings one at a time by selecting a star in each constellation's line drawing. To resume showing all line drawings, select a star not in a constellation line drawing. |
| | Toggle labels for constellations. To show one label at a time, select a star in the constellation you wish to label. You can add labels one at a time by selecting a star in each constellation's line drawing. To resume showing all labels, select a star not in a constellation line drawing. |
| | Toggle constellation artwork. To show one constellation at a time, select a star in the constellation you wish to show. You can add artwork one at a time by selecting a star in each constellation's line drawing. To resume showing all artwork, select a star not in a constellation line drawing. |
| | Toggle compass points. |
| | Toggle the ecliptic.<br>The ecliptic is the path of the sun across the sky. The planets and moon also lie on or near this line. Numbers on the ecliptic correspond to the months of the year and show when the sun will be in that position. The number for each month is roughly in the middle of that month's segment. |
| | Toggle the celestial equator.<br>The celestial equator is an extension of Earth's equator onto the sky. The labels are hour marks for right ascension. |
| | Toggle Earth's atmosphere. For the blackest night sky, turn off the atmosphere. |
| | Toggle celestial meridian.<br>The celestial meridian is a circle running through the north and south celestial poles; it passes through the zenith and intersects the observer's horizon at the north and south points. |

| Button | Normal Operating Mode Function |
|--------|-------------------------------|
| | Toggle the equatorial grid. |
| -7  -1  +1  +7 | Move forward (+) or backward (-) in time the specified number of Earth calendar days (or local sidereal days if you configured this is in menu item 2.3, described below). |
| | Toggle landscape. |
| | Increase size of moon to make phase more visible in full sky view. Press a second time to return moon to normal size. |
| | Change time and date to default settings. |
| | Enter menu mode. |
| | Toggle time and selected object information display. |
| | Step between 4 different meteor shower zenith hourly rates: 10 (background rate); 80; 10,000; 144,000. Meteors are assumed to be from dust that the Earth is passing through, so the peak is around 6:00 AM local time.  See the StratoScript meteor command documentation to set other rates and radiants. |
| | Select your saved home body. |
| | Enter media mode.  See page 21. |
| | Shift button. See functions in the following section. |
| | Cancel an object selection or other action. |

# Normal Operating Mode Shift Buttons

The shift button allows you to access additional features. To access the features below, first hit the ⊕ button, then the second button within three seconds. Both infrared signals need to be received by the computer in order for the action to occur.

| Button | Normal Operating Mode Shift Function |
|---|---|
| | Fly to selected body. |
| | Replay the last run script. |
| | Toggle galactic point cloud data.<br>(Sloan Digital Sky Survey DR7, http://www.sdss.org) |
| | Toggle constellation boundaries. |
| | Toggle planet and moon orbits. To show one planet orbit at a time, select a planet. To resume showing all planet and moon orbits, select an object other than a planet. |
| | Toggle the galactic coordinate grid. |
| | Toggle time lapse mode. As time passes, any natural objects will accumulate into a time lapse exposure.  Synthetic elements like labels will not accumulate. |
| | Toggle planet tropic lines.  These are lines of latitude equal to the limits of the travel of the Sun in the sky over one orbit of the planet around the Sun. |
| | Toggle Earth cloud cover when viewing the planet from above or from another body. |
| | Toggle azimuthal grid.<br>The azimuthal grid consists of parallels and meridians, with meridians crossing at the zenith (90 degrees above the horizon). |
| | Toggle Earth's precession circle. |
| | Reload user default configuration. |
| | Drop all bodies added from a script. If you are on one of these bodies, nothing will happen. |

## Using the Cursor

The cursor enables you to move around the sky and select objects. Selecting an object provides basic information about the object and prepares you to zoom in on it or fly to it.

When you start up your system, the cursor will be directly at the dome zenith.  To move the plus-shaped (+) cursor around the sky, use the arrow buttons as directed above in the table of button functions for normal operating mode. The cursor will move slowly when an arrow button is first pressed and will speed up if the button is held down.

To select an object near the cursor, press the  button. If your destination object is very bright, such as the Sun, you do not have to position the cursor right over it in order to select it. The brighter the destination object, the farther the cursor can be from it and still allow you to select it. To unselect an object, press the  button.

We recommend setting the cursor to time out (hide itself) after five seconds so that the cursor does not distract from the sky when it is not being used. If you wish the cursor to remain visible at all times, set the timeout value to 0 using menu item 6.9, described below.

# Menu Mode

This product uses a text-based menu system to modify configuration settings. The menu, activated by the ⊗ button, is displayed along the southwest horizon.

The configuration menu is organized into categories. Browse categories with the ◹ and ◺ buttons. Press ◸ or ↵ to enter a category.

Once within a category, browse the available configuration settings in that category with the ◹ and ◺ buttons.  Use ◸ or ↵ to begin editing the currently displayed setting.

While editing, the setting value you are editing is displayed in white. Use the number buttons 0-9 and "." or "-" to enter a number directly or use the ◹ and ◺ buttons to change gradually.

To finish your edit, press ↵ .  To cancel your edit press ⊘.
To leave the menu, press ⊗ again.

⚠ **Be sure to save your settings as default if want them to be used the next time you start up your system. See the "Administration" menu category.**

| *Button* | *Menu Mode Function* |
|---|---|
|  | Move up in list of options or increase number value being edited. |
|  | Go down a level in menu tree. |
|  | Move down in list of options or decrease number value being edited. |
|  | Go up a level in menu tree. |
|  | Select an option or finish editing a setting. |
|  | Enter the number 1. |
|  | Enter the number 2. |
|  | Enter the number 3. |
|  | Enter the number 4. |
|  | Enter the number 5. |
|  | Enter the number 6. |
|  | Enter the number 7. |
|  | Enter the number 8. |
|  | Enter the number 9. |
|  | Enter a decimal point. |
|  | Enter the number 0. |
|  | Enter negative values (for southern latitudes and western longitudes). |
|  | Exit menu mode. |
|  | Cancel a selection. |

# Menu Tree

⚠ **Only items that apply to your system will be visible.**

1. **Set location**
   **1.1 Latitude:** Use + for north and – for south.
   **1.2 Longitude:** Use + for east, -  for west.
   **1.3 Altitude:** Distance above anchored object.
   **1.4 Heading:** Rotate the sky simulation in your dome.
   **1.5 Landed Pitch:** If you have a tilted dome but want to keep the horizon at a natural level, adjust here while landed on a body.

2. **Set time**
   **2.1 Sky Time:** Set your sky for a different time.
   **2.2 Set Time Zone:** Select continent, then city in your time zone. These account for daylight savings, if any. Be sure to update the time zone if you change longitude, or the time will not correspond to the sky.
   **2.3 Day Keys:** Choose between calendar days or sidereal days for time steps with the
    buttons. A sidereal day will vary in length depending on the planet or moon from which you are viewing the sky. Sidereal days are great for demonstrating planetary motion.
   **2.4 Preset Sky Time:** Only used if startup time is set to "preset."
   **2.5 Sky Time at Start-up:** Use the actual clock time when you start up, or use a preset time you have chosen.
   **2.6 Time Display Format:** 12 or 24 hour format.
   **2.7 Date Display Format:** Choose between: yyyy-mm-dd; yyyy/mm/dd; dd/mm/yyyy; and mm/dd/yyyy.
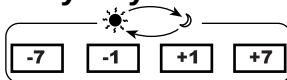
3. **General**
   **3.1 Landscape:** Change the projected landscape.
   **3.2 Sky Culture:** Select culture for constellations.
   **3.3 Sky Language:** Select language for star, planet, and constellation labels.
   **3.4 Translate Constellation Names:**  Do you want constellation labels translated into your sky language?
   **3.5 Label Scale:**  Scale sky labels up or down.  Default is 1.

4. **Stars**
   **4.1 Show:** Display or hide the stars.
   **4.2 Maximum Magnitude to Label:** Increase or decrease number of stars labeled.
   **4.3 Twinkling:** 0 equals no twinkle; 1 is the maximum.
   **4.4 Limiting Magnitude:** Increase or decrease number of stars projected based on their apparent magnitude. Default value is 6.5. This only affects stars. Set the light pollution luminance for a more realistic and comprehensive effect (menu item 6.1).
   **4.5 Core Density:**  Adjust the intensity of the halo core for stars and bodies.
   **4.6 Halo Density:**  Adjust the intensity of the outer halo for stars and bodies.

**4.7 Star Catalog:** By default your system uses the Hipparcos star catalog (around 100,000 stars). NG Professional systems may be able to use the TGAS catalog (over two million stars) depending on hardware performance. Restart NG for a change to take effect.

5. **Colors:** Adjust red, green, blue, and alpha values independently from 0 to 1.
   **5.1 Azimuthal Grid**
   **5.2 Cardinal Points**
   **5.3 Circumpolar Circle**
   **5.4 Constellation Art**
   **5.5 Constellation Boundaries**
   **5.6 Constellation Lines**
   **5.7 Constellation Names**
   **5.8 Ecliptic Line**
   **5.9 Equatorial Grid**
   **5.10 Equator Line**
   **5.11 Galactic Grid**
   **5.12 Galaxy Points** (SDSS galaxy point cloud)
   **5.13 J2000 Grid**
   **5.14 Meridian Line**
   **5.15 Nebula Circle**
   **5.16 Nebula Names**
   **5.17 Planet Names**
   **5.18 Planet Orbits**
   **5.19 Precession Circle**
   **5.20 Satellite Orbits**
   **5.21 Tropic Lines**

6. **Effects**
   **6.1 Light Pollution Limiting Magnitude:** Simulate the effects of light pollution. Value is naked eye limiting magnitude at full sky view.
   **6.2 Manual Zoom:** Zoom in or out on selected object in small steps rather than one large step.
   **6.3 Milky Way Intensity:** Adjust the brightness of the Milky Way, from 0 to 100. Default intensity is 1.
   **6.4 Focal Point Altitude:** Adjust the altitude of your focal point above the horizon. Track an object to visualize the focal point position while adjusting.
   **6.5 Focal Point Azimuth:** Adjust the azimuth of your focal point (this angle is measured from the up direction on your video source rather than North).
   **6.6 Zoom Duration:** Amount of time (in seconds) it takes to zoom in on an object.
   **6.7 Flight Duration:** Amount of time (in seconds) it takes to fly to another body.
   **6.8 Cursor Timeout:** Amount of time (in seconds) pointer will remain visible in the sky, from 0 (no timeout) to 60. Moving cursor or selecting/deselecting the cursor will make it reappear in the sky in its last location.
   **6.9 Line Width:** Adjust the width of drawn lines from 0.125 to 5 pixels.
   **6.10 Maximum Body Magnitude to Label:**Only draw orbit lines and labels for bodies with a magnitude brighter than this setting.
   **6.11 Atmosphere Sun Bloom:** Increase or reduce the Sun bloom effect in the

atmosphere.

**6.12 Correct for Light Travel Time:** Account for the travel time of light when observing solar system bodies and moons. Turn this on so that zoomed views match up with actual telescope views. Note that this is a close approximation due to performance considerations.

**6.13 Dome Tilt**: If your dome is tilted and you want to adjust your landed horizon to be level.

## 7. Rendering

**7.1 Light Exposure:** Adjust the brightness of sunlit objects like planets and moons.

**7.2 Gamma:** Adjusts the differences between light and dark colors. Ideally this should match the gamma setting in your projector.

**7.3 Saturation:** Adjust how saturated colors are when displayed.

**7.4 Atmosphere Multiplier:** Adjust the luminance of the daytime sky. This may affect visual extinction times for stars, etc.

## 8. Administration

**8.1 Load default configuration**: Return all settings to your defaults.

**8.2 Save current configuration as default:** Option says "Do." Save all current settings as default. Includes state of all settings, such as latitude, longitude, planet labels on or off, etc. This will also save current media positioning configuration (see the Media Mode section on page 21).

**8.3 Shut down:** Shut down computer control unit. Option says "Do." Hit  and it will prompt "Are you sure?," and then hit the same button once again to shut down.

**8.4 Update me via Internet:** Option says "Do." See Software Updates section below for directions.

**8.5 Set UI Locale:** Change menu language.

**8.6 Projector Offset (percent of dome radius)**: Adjust the projection to correct for the lens being placed off-center in a dome. Results will vary by model.

**8.7 Synchronize Internal Drive with USB Drive**: This is a bidirectional drive synchronization, meaning that any file system changes on the internal drive are copied to the external USB drive and vice versa. You can hit the cancel button during a sync to stop it, although there may be a delay. See Bidirectional Drive Synchronization below for more information.

**8.8 Projection Configuration:** If your Digitarium model supports more than one projection configuration you can select an option such as:

- **Lens at Dome Center**: The lens is at the center point of the dome (at the spring line of the dome). The horizon will not reach down to the dome spring line. This is a typical portable dome configuration.
- **Lens Below Dome Center**: The lens is below the dome zenith, but located below the spring line of the dome so that the horizon reaches down to the edge of the dome. This is a typical fixed dome configuration.
- **Truncated Projection**: You want to project a higher resolution but truncated (cut off) projection.

**8.9 Info:** Displays the operating platform version, the last time a software update was installed on the system, and the system network address, if any.

**8.10 Video Shear**: **[Digitarium® Delta 1 systems]** If the East and West horizons (with heading set to 0) are either both above or both below the North and South horizons, this setting allows you to adjust this until you have a level horizon.

**8.11 Video Offset: [Digitarium® Delta 1 and Iota systems]** If the projection system is level but the projection is tipped to East or West (with heading set to 0), this allows the projection to be re-centered so that East and West horizons are level.

**8.12 Reset password for Universal Console** (will not appear if you do not have the Universal Console software).

**8.13 Reload factory defaults:** Resets all defaults to original factory settings.

**8.14 Restart Nightshade:**  Exit and restart quickly.

**8.15 Set Media Plugin**:  The default is "standard" while "vdec" is a newer plugin that includes hardware accelerated playback but can be more finicky.  Vdec and specially encoded and named videos are recommended for 2k resolution systems and up. Vdec guidelines are at: **https://www.nightshadesoftware.org/projects/community/wiki/Vdec_Release_Notes**

# Bidirectional Drive Synchronization

Your external Digitarium Master Media drive came synchronized with your internal media drive in your system.  If you want to make changes you can make those on the master on another computer and then sync those to the internal media drive using menu item 8.7.

If you delete files on your master drive, those will also be deleted on your internal drive when you next sync.  Rather than deleting these during a sync, files are moved to a ".recovery" tree on the same disk.

Digitarium Professional users with the Universal Console can edit files on the internal drive (see the Script tab) and recover files from the internal drive recovery area.  During a sync, changes on the internal drive will also propagate to your external drive.

If you lose your master drive, you can now create a new one.  Get a new external drive of the required size, and then perform a sync to get the contents of your internal drive.

On your external drive there is a ".digisync" folder with a sync log and state information for use during synchronization.  For best results, do not modify or remove these files.

# Media Mode (Visual Media Browser)

The Digitarium system control unit allows you to show your own or third-party content from a USB drive or the internal hard drive, fully integrated into Nightshade NG.  Show images, play videos, play audio, or even run StratoScript scripts.
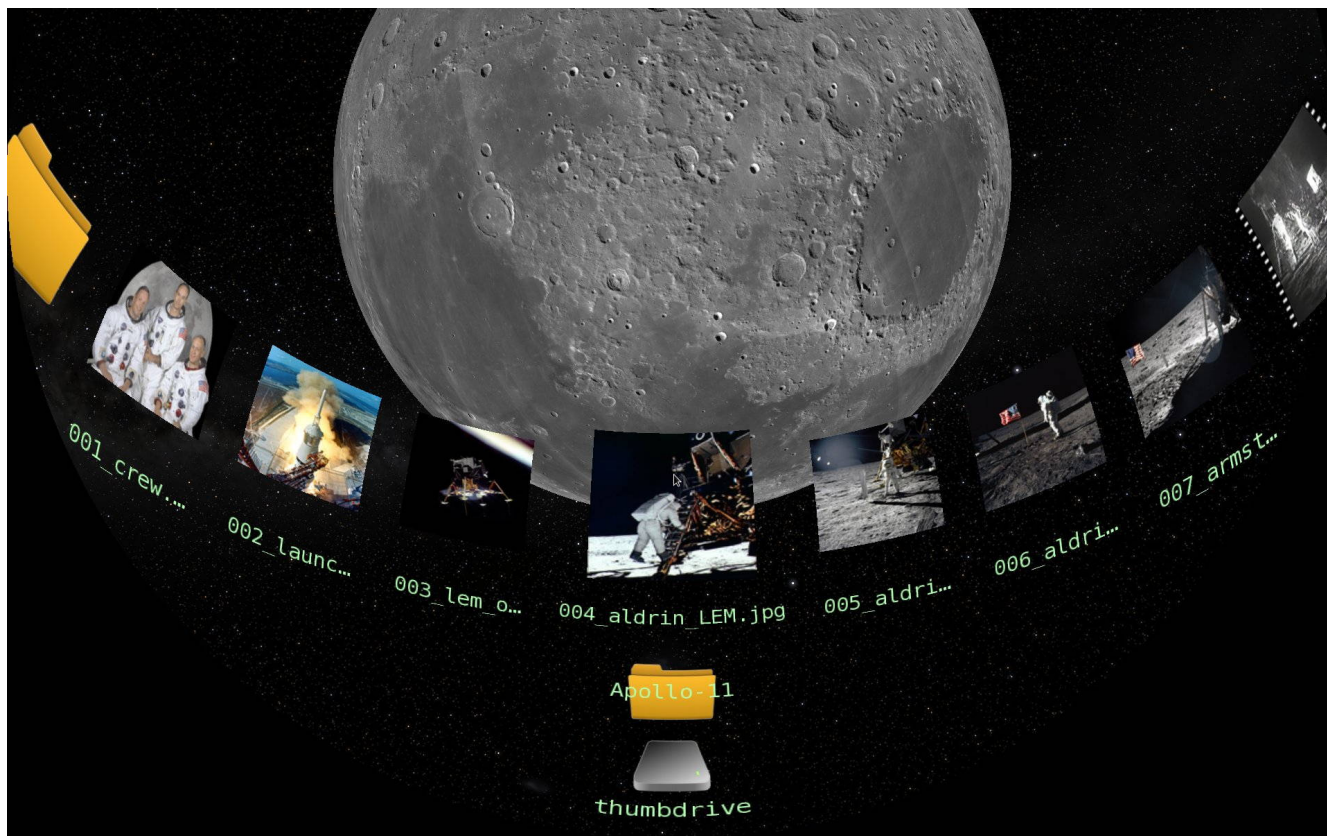


Many common formats of still images and video are supported. Audio files in WAV or OGG format can be played. To show your own content, copy them to a USB drive or the internal hard drive (see menu item 8.7 above). See the "Creating Multimedia Content" section on page 25 for directions.

The internal hard drive is the most convenient storage option as you can store content directly in your system.  Simply select "Internal" from the list of drives in the Media Browser to access this content.  You synchronize content to the internal hard drive from a master USB drive using menu item 8.7, described above.

To use a USB drive:

1. Insert the drive into any of the USB ports on the Digitarium control computer. Wait a few seconds for the system to recognize the drive.
2. Bring up the media browser as normal and go to the root level where drives are shown.

3. If your drive was mounted, you will see it shown and labeled with its drive label.
4. Use the left or right arrow buttons to highlight the USB drive and press
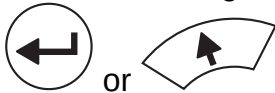
or to select the USB drive.

5. If your USB drive has displayable content you will see the directory contents. Otherwise you will see an error icon.

**Removing USB Drives**

We recommend that you only remove a USB drive when the system is in normal operating mode (Media Browser is closed).

**Managing Large Video Files**

If you need to show video files over 4 GiB in size, format your USB drive with an NTFS file system on a PC using the Windows disk format feature.

| Button | Media Mode Function |
|---|---|
| ⊕ | Increase size of a still image or video. |
| ⊖ | Decrease size of a still image or video. |
| ↖ | View directory or drive.  View or play selected file.  If you play a script you will exit media mode and enter script playback mode (see page 27). |
| → | Move right to next item in directory. |
| ↓ | Stop viewing a file or, if viewing a directory, go back a level in directory tree. |
| ← | Move left to next item in directory. |
| ↵ | View directory or drive.  View or play selected file.  If you play a script you will exit media mode and enter script playback mode (see page 27). |
| ❙❙ | Pause/continue playing video. |
| ■ | Stop displaying an image or video and return to directory. |
| ◀◀ | Jump backward in playing video. |
| ▶ | Resume playing paused video. |
| ▶▶ | Jump forward in playing video. |
| ⤢ | Toggle between full dome and perspective projections for displaying media. |
| ☀T 1 | Toggle sky or black background when browsing or displaying media |

| Button | Media Mode Function |
|---|---|
| 2 | Move perspective image or video up towards the zenith. |
| 3 | Mirror image or video on opposite side of dome when in perspective projection mode. |
| 4 | Move perspective image or video to the left. |
| 6 | Move perspective image or video to the right. |
| 7 | Rotate media browser to the left. |
| 8 | Move perspective image or video down towards the horizon. |
| 9 | Rotate media browser to the right. |
| . | Perspective mode: Rotate image or video counter-clockwise in place. Fulldome mode: Rotate image or video around the dome in a North to West direction. |
| – | Perspective mode: Rotate image or video clockwise in place. Fulldome mode: Rotate image or video around the dome in a North to East direction. |
| | Reload default media position configuration. Your settings are saved when you save your default settings in the Nightshade configuration menu (item 8.2). |
| ⊕ then | Reload factory default media position configuration. |
| -7  -1  +1  +7 | Decrease (-7) or increase (+7) video volume. May not work with some videos. |
| | Exit media mode and return to normal operating mode. |
| ? | Toggle open captions for audio or video files (discussed below). |
| | Stop displaying an image or video. |

# Creating Multimedia Content

Collecting images and/or videos onto a USB drive allows you to cover any topic in the dome. Create slide shows for use in your lessons, or just have extra content on hand for questions that may come up.

You can find an enormous amount of content on the Internet that is free to use (check licenses to be sure). You can also easily create your own images with an image editor. A full dome image should be at least as large as your system resolution.  If an image is larger than the projector resolution, it will be scaled down to fit when displayed.

Most common image and video formats should work. However, due to the huge variety of video encoding formats available, you will probably encounter some video formats which will not play. The only way to know for sure is to test your file with the system.  MPEG-2 or MPEG-4 video is generally the best option, if you have a choice.

## Organizing Media

Start by creating a directory where you will set up your disk content. If you want to organize your content into categories, you can create subdirectories. You can create any sort of directory tree you want, to as many levels as you need.

After you have created your directory, place your content into your directory tree so that you will be able to find it easily.

Tips for naming files:
• Use logical, easily understandable names.
• Keep the file and directory names short or they will be abbreviated in the media browser.
• Keep the original file extension (.jpg, .mpg, .tif, etc.).
• Remember that subdirectories and files within a directory will be sorted alphabetically in the media browser, and that subdirectories will always appear before files in the list.
• If you want to  create a slide show with images in a definite order, an easy solution is to append a zero padded number to the name. For example,
    • 01-start.jpg
    • 02-intro.tif
  ...
    • 19-conclusion.jpg

Once you are happy with your directory structure and content, save to your USB drive and either use directly or synchronize to the internal hard drive.

Remember to try your disk in the system to see how it turned out and make adjustments if needed.

## Saving Content to a USB Drive

Usually copying files to a USB drive is as simple as inserting the drive into a USB port on a computer, then copying over the files to it. The Digitarium system will not write to the drive itself and requires that there is only one partition on the drive.

## Saving Content to the Internal Hard Drive

See menu item 8.7, above.

## Media Scaling by File Name

### Fulldome Video

If you always want to scale an image or video to fit the resolution of your system, you can simply rename the video file to end with a ".full." before the extension.  For example: "video.full.mpg"  On Windows PCs the extension may be hidden from you, in which case this may appear as "video.full" in the file explorer.

### Spherical Video

If you want to easily display 360 degree (equirectangular spherical) image or video, rename the file with a ".360." before the extension.  For example: "video.360.mp4"  While viewing the media you can pan and tilt with the remote or gamepad to look around.

## Open Captions

Open captions are lines of text that can display on the dome horizon while a video or audio file is playing.  Open captions offer an alternate form of communication for those with hearing issues or who speak another language.  Local disabilities laws may require the use of captions with prerecorded content.

When a video or audio file is started, the system will look for a captions files in SRT format. SRT is a very simple text file format that you can create yourself if needed:

> https://en.wikipedia.org/wiki/SubRip#SubRip_text_file_format

If you play a file called "myvideo.mp4" the system will look first for a caption file called "myvideo.mp4.en.srt" where 'en' was the current sky locale (English).  If no such file exists, the general "myvideo.mp4.srt" will be used, if present.

Caption display can be toggled with the ⑦ button.

# Script Playback Mode

Scripting makes it relatively easy to create your own prerecorded segments and play these back on a Digitarium system. This allows you to automate repetitive or awkward tasks, customize aspects of Nightshade, or even create complete prerecorded shows. See the scripting documentation in your user manual binder for more information.  Also be sure to visit the Digitalis Community website to download or share scripts and other resources:

> http://Community.DigitalisEducation.com

To run a script, bring up the Media Browser and navigate to the directory containing your script.  Then just select the script with the ⟨↑⟩ or ⟨↵⟩ buttons.  The Media Browser will close and the script will begin playing.

While a script is playing, you can pause, fast forward, play, stop, and adjust the volume as needed; you cannot rewind a script.

| *Button* | *Script Playback Mode Function* |
|---|---|
| ⏸ | Pause/continue script playback. |
| ⏹ | Stop script playback. |
| ▶ | Play script at normal speed. |
| ⏩ | Fast forward script. Can be pressed multiple times for faster rates. |
| -7  -1  +1  +7 | Decrease (-7) or increase (+7) script audio volume. |

# Random Access Script Feature

If you have a compatible remote control version you can play a script directly from the remote control in normal operating mode without having to bring up the menu.  Simply begin your script file names with two digits from 00 to 99.  Press the ⑤ button followed by the two digits within three seconds. Use the numbers printed next to the central buttons to enter digits. Once entered, Nightshade will search through the "/scripts" directories on the internal drive and mounted USB drives (in alphabetical order by label name). The first script found starting with those two digits will then be run, and you will be in script playback mode.

For example, if you had a script called "04-analemma.sts" in the scripts directory of your internal drive, you could start playing this script by pressing: ⑤ + [⊕ ⁰] + [↗ ⁴]

Note that if you take more than three seconds to enter your digits, the number pad area buttons will stop functioning as digits and you will end up performing normal button actions.

# Software Updates

This product is driven by software, and it can be updated easily over the Internet. Software updates allow you to receive changes and enhancements that were made after your purchase. The update process will also correct your system date and time, if needed. Updates are free for the life of your system. Update descriptions and download sizes are posted in the support section of the Digitalis website.

To update the software:

1. Locate an Ethernet network that supports the DHCP protocol and has Internet access. The system will need to be able to open an outgoing connection on TCP port 80. This is usually not a problem unless you are behind a restrictive firewall. See your local network administrator if you need assistance with this.
2. Plug a network cable into the socket located on the system.
3. Bring up the menu using the Digitarium system remote control, and go to menu section 8, Administration.

4. Scroll down to 8.4, "Update me over the Internet" and press ⏎ .

5. Press ⏎ to start and ⏎ once more to confirm.


⚠ **Do not shut down your system while performing an update. This can lead to a corrupted system that won't function.  If there is a problem, the update should provide an error message. Otherwise it is still working and you will see a continuing animation.**


6. When done, you can unplug the network cable and return your Digitarium system to its usual use. If the update does not work, you will receive an error message explaining what went wrong.

**We strongly encourage you to have a technical person who is familiar with your network assist you during your first attempt at software updating. Some network changes may be required in order for the updates to occur.**

# Add-On Data Sets

Enhance your exploration of planetary sciences with optional satellite and space probe data.

High resolution add-on data will enhance your shows with topography and/or imagery for select body surfaces. With your own local data there are no network or server headaches, no waiting for data to download, and no need to preplan your flight!
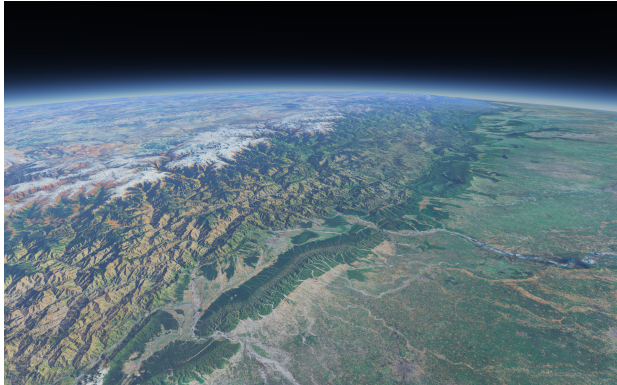

Whole Earth data set


Solar System Collection: Moon


Washington State data set
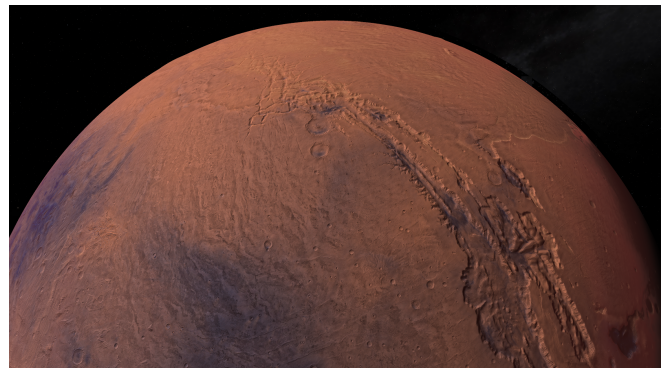

Solar System Collection: Mars

## Add-On Data Instructions

If you just received a new add-on data set you just need to plug it into your system, update your system, and reboot to start exploring.  Instructions for inserting external and internal drives follow:

### Inserting External USB Drives

Some systems will have an external drive already attached. Should you need to set up an external drive:

1. If you have received an external USB drive, first plug the blue connector on the included USB cable into a blue USB slot on your control unit.

2. Next, if your drive came with a Y connector cable, plug the white USB connector into any available USB slot on the control unit.

3. Next, connect the drive connector end of the cable into the hard drive.

## Inserting Internal SATA Drives

Drives are already inserted into your CU-1 and if Add-On data was included at the time of system purchase. Should you need to insert a newly purchased drive:

1. Grab your drive bay key from your user manual binder and unlock bay 3 or 4.

2. Open the drive bay door and insert the drive, sliding the large unlabeled side of the drive along the right side of the bay as shown in the image at right.

3. Close the bay door and lock it.  Be sure to put your key back where you keep it.

# Troubleshooting Common Problems

| Symptom | Possible Solution |
|---|---|
| Remote buttons don't seem to work. | 1. Are you in menu mode or playing a script? If so, exit.<br>2. Are you aiming the remote control at the zenith (or external IR receiver)?<br>3. Point the remote directly into the infrared receiver window and push a button.<br>4. Check and replace the remote control batteries.<br>5. Remove sources of IR interference such as Sunlight or fluorescent lights and then reboot the computer using the reset button. |
| Can't find cursor. | 1. Are you in menu or media mode? If so, exit.<br>2. Press the remote control arrow buttons to move the cursor so you can find it. (The cursor may have been set to time out via the configuration menu item 6.8. If you do not wish the pointer to time out, enter 0 as the cursor timeout value.) |
| Wireless gamepad does not work at all | 1. Did you plug in the USB receiver into the Digitarium computer before booting?<br>2. Did you pair your gamepad to the receiver?  See instructions that came with the gamepad.<br>3. Press the large center button (button 7 on diagram on page 5) and hold for at least one second.  This should wake up the gamepad.<br>4. If the center button is not flashing green (Microsoft Xbox controller) then replace your batteries in the gamepad and start over.<br>5. If that fails, you may need to pair your gamepad to the receiver.  See the instructions on page 6. |
| Wireless gamepad does not work well or gets stuck moving certain directions | 1. Make sure you have line-of-sight visibility between the gamepad and the receiver.<br>2. Minimize other wireless interference in your dome on the 2.4GHz frequency.<br>3. Move closer to the receiver.<br>4. Replace the batteries. |
| No sound when playing a video. | 1. Are you sure the video has an audio track?<br>2. Do you have speakers plugged in, turned on, and turned up loud enough to hear?<br>3. Turn up the volume using the +7 button |
| Wireless gamepad flashes in an alternating pattern. | Replace the batteries. |

| Symptom | Possible Solution |
|---|---|
| Blotches of light across zenith while displaying video from an external source. | This happens when an image or video has bright regions outside the projection circle. This can also be caused by projector menu or notification messages.  Size or mask images and videos so that no bright part is outside the projected area, or avoid showing images or videos with these bright regions.  Nightshade performs dynamic masking so that this is not necessary while projecting content from the Digitarium computer. |
| Computer does not seem to boot. | Make sure the computer has power and that the main power switch (if any) is on.  Look for the hard drive light flashing during boot up.  If the computer is running the case fans should be running and detectable.

Plug in speakers or headphones before booting so that you can hear the audible startup music when Nightshade has started.  If you DO NOT hear the music, the problem may be a loose video card if you have a CU-1 computer.  With power off jiggle the video card by grasping the vide cable connector.  End by pushing down, away from the "Digitarium" labeled cover.

If you hear the music, make sure your projector has the correct input source selected and that it is operating properly (bring up the projector menu, for example).  If those seem correct, try reseating the video connectors and rebooting, or try a new video cable and reboot. |

# How to Get Help

If you are experiencing problems with your Digitarium system, please:

1. Reread the manuals, especially the trouble shooting sections, to make sure you haven't missed a possible solution.
2. Contact your local distributor, if any:




3. Or create a support ticket (in English) with Digitalis Technical Support by going to the Support section of the Digitarium Community site at: http://Digitarium.com/community/
4. Did you know Digitalis offers a Priority support package that includes 24/7 telephone support? If you would like details and pricing please contact your Digitalis sales representative or email sales@DigitalisEducation.com.

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2. Software released under the GNU General Public License (GPL) or similar open source licenses can be copied or modified as long as the licenses are complied with.  Open source code used in your system is available on the Digitalis Community website at:
	http://community.DigitalisEducation.com/opensource

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    1. The System and the Program do or may utilize third-party software, data, and libraries with separate licenses.  License information is included in the System package management system and Documentation.

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    **4.** A Digitarium SkyBox computer may only display the Program on a flat screen display (not a dome, for example).

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**6. General Terms**

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2. **Limitation of Liability**. In no event will either party be liable for any indirect, incidental, special, consequential or punitive damages, or damages for loss of profits, revenue, business, savings, data, use or cost of substitute procurement, incurred by either party or any third party, whether in an action in contract or tort, even if the other party has been advised of the possibility of such damages or if such damages are foreseeable. In no event will Vendor's liability for damages hereunder exceed the amounts actually paid by You to Vendor for the Program. The parties acknowledge that the limitations of liability in this Section and in the other provisions of this Agreement and the allocation of risk herein are an essential element of the bargain between the parties, without which Vendor would not have entered into this Agreement. Vendor's pricing reflects this allocation of risk and the limitation of liability specified herein.

3. **Severability and Waiver**. If any provision of this Agreement is held to be illegal, invalid or otherwise unenforceable, such provision will be enforced to the extent possible consistent with the stated intention of the parties, or, if incapable of such enforcement, will be deemed to be severed and deleted from this Agreement, while the remainder of this Agreement will continue in full force and effect. The waiver by either party of any default or breach of this Agreement will not constitute a waiver of any other or subsequent default or breach.

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