

## CHAPTER

## 6

# Start up, Homing and Draping

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Preparation of Da Vinci Surgical System for surgery includes powering up the system components, homing the system and draping of the patient cart.

The chapter will cover the following topics:

- Powering on the Vision Cart
- Powering on the Illuminator
- Powering on the Surgeon Console and Patient Cart
- Homing the System
- Draping of camera and instrument arms

## **POWERING ON THE VISION CART**

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Illuminator, focus controller, the CCUs and any user-installed ancillary equipment, such as an insufflator, a video recorder or ESU are placed on the vision cart. Power is supplied to these devices via the isolation transformer or power strip. Power on the Vision Cart using the switch located on the isolation transformer in the rear of the cart. Once power is applied to the cart, verify that the power strip, CCUs, intercom system, and any auxiliary equipment are powered on. If not, they need to be powered on.

## **POWERING ON THE ILLUMINATOR**

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Power on the illuminator by pressing the power button located in the bottom right corner of the illuminator face plate (Figure 1). Press the Lamp On/Off button (Figure 1) to turn on the illuminator lamp.

The illuminator need not be turned off if operation is required within 30 minutes. Instead, simply press the CLOSE (0%) button when the illuminator is temporarily not in use.



**Fig. 1:** Location of Power Button on the Illuminator

## POWERING ON THE SURGEON CONSOLE AND PATIENT CART

### Power on Procedure

There are two different options for powering on the da Vinci System. These are the Integrated Mode and Stand Alone Mode.

### Integrated Mode

Integrated mode is required for full system operation. When the Surgeon Console and Patient Cart are connected by the red system cable and plugged into wall outlets, the system is powered on by pressing the power button on the right side pod of the Surgeon Console (Figure 2).

### Stand-alone Mode

Stand alone mode enables either the Patient Cart or Surgeon Console to be powered on individually. This mode helps in positioning the patient cart / adjustments in surgeon console prior to system connection.

While the Patient Cart is in stand-alone mode, the LEDs and touchscreen monitor will not provide any feedback, and system accessories will not engage until the Surgeon Console and Patient Cart are connected and homed. The Patient Cart motor drive and clutch buttons may be used when not connected to the system and /or AC power. This helps in positioning of the patient cart on the desired position.

While the Surgeon Console is in stand-alone mode the Stereo Viewer height may be adjusted.

To power on the Surgeon Console in stand-alone mode, ensure that the Surgeon Console is plugged in, and press the Power button (Figure 2) on the right-side pod.



**Fig. 2:** Location of power button on surgeon console



**Fig. 3:** Location of Patient Cart Power Button

To power on the Patient Cart in stand-alone mode, press the Cart Power button on the patient cart control panel (Figure 3). The Patient Cart does not need to be plugged in for stand-alone mode.

The patient cart and surgeon console may be powered on and connected in any order. The Surgeon Console and Patient Cart batteries should be adequately charged. Following pre-requisites must be fulfilled before the system will be fully functional:

- Both the Surgeon Console and Patient Cart are plugged in and powered up
- The Surgeon Console and Patient Cart are connected by the red system cable. (The red system cable may be connected at any time, but once connected, cannot be unplugged until the system has been completely powered down.)

## START UP SEQUENCE

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The start up sequence is a system integrity test that lasts for approximately 30 seconds. While the system is powering on, all the lights on the Left and right-side pods will briefly illuminate while a system self test is performed. Once the self test is successfully completed, the system is ready for homing and the following message is displayed:

Prepare Masters and Patient Cart Arms for homing.  
Remove instruments. Press HOME when done.

During the startup sequence, one should not put his head or other objects in the stereo viewer. Do not activate any of the DVSS controls, including the surgeon console pod buttons, clutch buttons, footswitches, etc. While most button presses will be ignored during the startup sequence, some may cause a non-recoverable fault. One cannot override a non-recoverable fault and the system has to be restarted. The Emergency Stop feature is available during startup if needed.

## HOMING THE SYSTEM

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Homing is performed to calibrate the master controllers and the patient cart arms after system self-test. The master controllers will move to their start position during the homing sequence. The instrument arms of the Patient Cart will fully extend and will perform a short mechanical integrity test if they are not already extended. Three beeps are heard after the homing process is completed.

For patient safety, if the system detects a mounted sterile adapter, instrument, or cannula prior to homing, the patient cart arms will not move during homing. This prevents any inadvertent trauma to the patient in case homing sequence is started accidentally. Instruments should be removed when homing the system, as long as this is clinically acceptable.

The following message is displayed:

Prepare for homing . Instruments and Camera will not move.  
Press HOME when done.

## HOMING PROCEDURE

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To Prepare for Homing:

- a. Ensure the Patient Cart arms will have adequate room to move during the homing sequence. To do this, use the arm and port clutch buttons to move the Patient Cart arms as needed. If configured and using instrument arm 3, ensure it is in front of the patient cart tower for homing. Based on the planned use during the procedure, position the instrument arm 3 accordingly. To move instrument arm 3 from one side of the Patient Cart to the other, release the latch on the setup joint link closest to the Patient Cart tower. Then use the port clutch button to move the arm to

the opposite side of the Patient Cart. Ensure the setup joint axis re-latches when the arm is moved to the other side.

If instrument arm 3 is not to be used during the procedure, leave the arm in the stow position

- b. It is ensured that the master controllers will have adequate room to move during the homing sequence. To achieve this, the master controllers are manually repositioned so that they are centred under the stereo viewer with several inches space between them.

To Complete Homing:

- a. The HOME button on the surgeon console pod is pressed. Three "happy" chimes will sound and alternating "question mark" and "camera" icons will display when the homing process is complete, along with the message:  
Ready . Prepare Patient Cart; for Surgery.
- b. The Patient Cart arms are prepared for draping by moving each arm's insertion axis to a vertical position. While draping instrument arm 3, it is ensured that it is in front of the patient cart tower. Then the touchscreen monitor is moved to the bottom of its range of motion.

## STOW-POSITION

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Instrument arm 3 is designed to be stored during a procedure if it is not required. Instrument arm 3 cannot be activated from the pod of the surgeon console when it is in stow position. In addition, when in stow position, instrument arm 3 will not move during homing.

To put instrument arm 3 in stow position,

1. The first setup joint link of instrument arm 3 is directed towards instrument arm 2.
2. Once instrument arm 3 is behind the Patient Cart tower, the instrument arm insertion axis is collapsed entirely and pitched into the full back position. While in stow-position, the only LEDs and icons for instrument arm 3 that function are for clutching and fault states.
3. The insertion axis is moved to its fully collapsed and pitched back position.
4. The setup joint links are moved as close to the patient cart tower as possible ensuring the instrument arm will tuck under the bottom-most link.
5. The entire setup joint is moved to the bottom of its vertical range of motion.

Instrument arm 3 may be taken out of stow position at any time by using the port clutch button to move the arm. As soon as the port clutch button is released in front of the patient cart tower, the arm is enabled and the insertion axis extends in preparation for draping.