

CHAPTER

4

System Connections

Dr. R.K. Mishra.

MBBS (Honours); MS; M.MAS; MRCS; F.MAS; D.MAS; FICRS, Ph.D (Minimal Access Surgery)

Various connections are needed in between the various components of the robot. These connections carry vital information between various components and help in system integration. It includes the following:

- Power Connections
- System Cable Connections
- Auxiliary Device Connections
- Video and Audio Patch Panels
- TilePro Connections
- Recording From The System

POWER CONNECTIONS

AC power cords of the Surgeon Console, Patient Cart, Vision Cart and illuminator are connected to the wall outlets (Figure 1). Single dedicated AC circuits are required for surgeon console and patient cart while vision cart requires two dedicated AC circuits. The Surgeon Console and Patient Cart should always remain plugged in even when not in use to ensure that the backup battery stays fully charged. A cooling fan on the Patient Cart runs continually when the Patient Cart is plugged in. No extension cords are to be used with any of the system components.

SYSTEM CABLE CONNECTIONS

The da Vinci S System comes with three main cables (Figure 2). Appearing from left to right are the blue, red and green cables, ordered from largest to smallest diameter. The three cables can be distinguished by their diameter and color. Otherwise, all three should appear identical at both ends. The length of each of these cables is 50 feet.

The red cable is the most important cable that transfers all the data, audio and video signals from the surgeon console to the patient cart (Figure 3). Once the system is connected and powered on, the

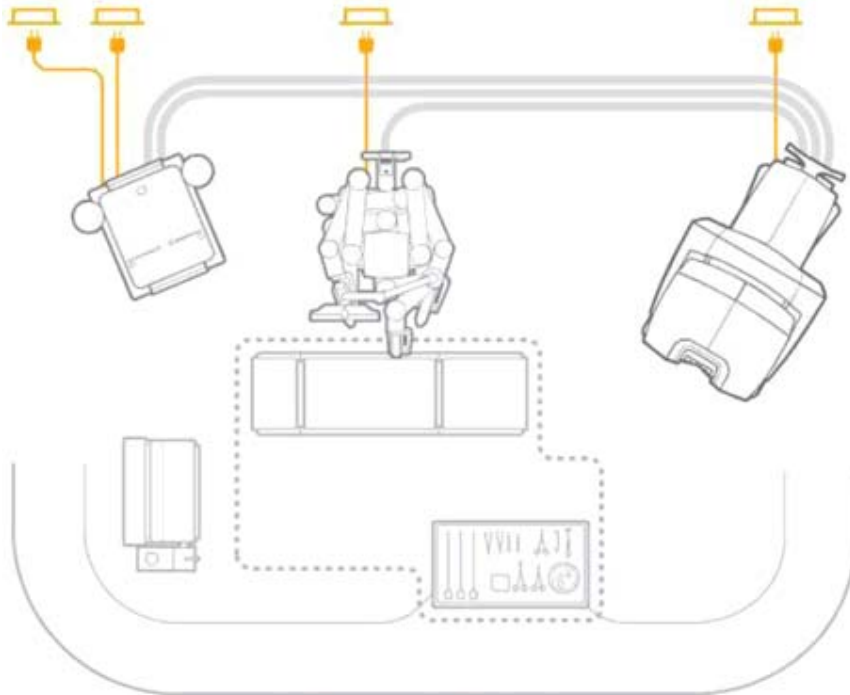


Fig. 1: Power connections of various system components

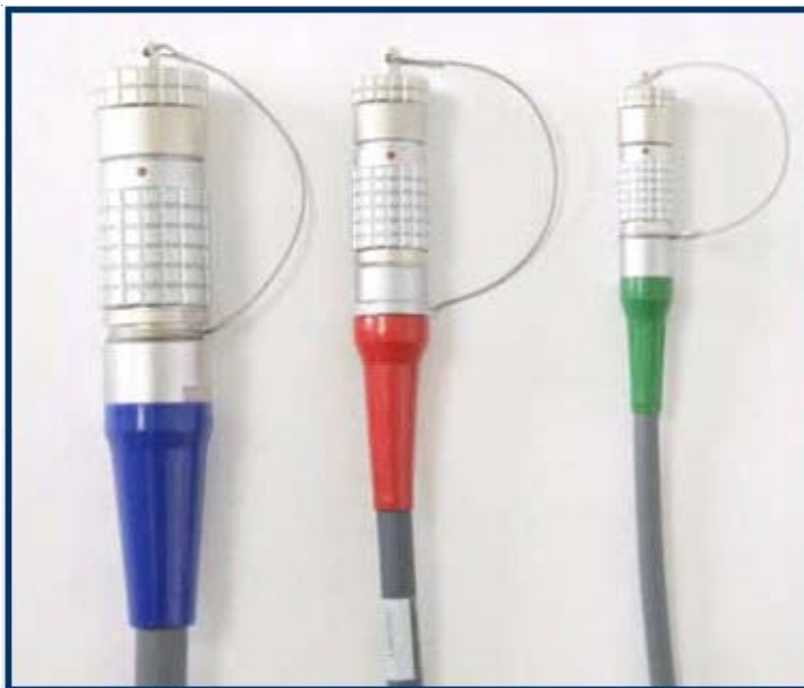


Fig. 2: System Cables

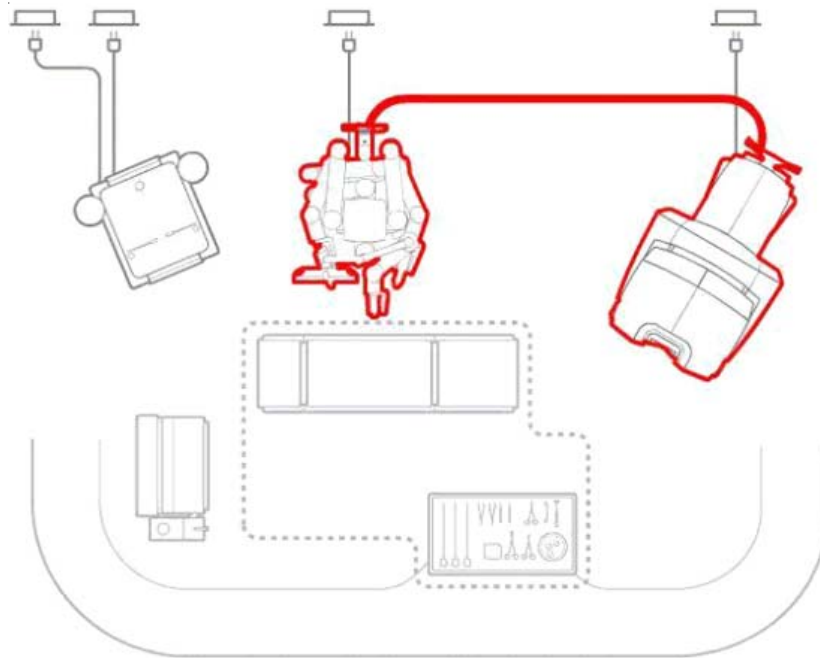


Fig. 3: Red cable connecting master console to patient cart

red system cable should not be unplugged until the system has completely powered down. The comparison between various cables is given in table 1.

Lay the system cables out between the components as shown in Figure 4. The arrangement of the cables should be such so that they are out of the path of OR traffic. This is important to avoid damaging the cables or creating an obstacle or hazard. The location of the cables should not interfere between easy movement of the Patient Cart from its preoperative (draping) and intraoperative locations.

TABLE 1: System cable specifications

<i>Cable</i>	<i>Diameter</i>	<i>Purpose</i>	<i>Storage</i>	<i>Remark</i>
Red	Medium	Passes video, audio, and data during system operation between surgeon console and patient cart	Stored on the cable hook located on the back of the Patient Cart	Avoid bending as fibre-optic core, should not be unplugged until system has powered down.
Blue	Widest	Passes video signals between the Surgeon Console and Vision Cart	stored on the cable hook located on the back of the Vision Cart	Disconnection results in loss of video signal and triggers a recoverable fault
Green	Smallest	Passes audio between the Surgeon Console and the Vision Cart	stored on the cable hook located on the back of the Vision Cart	Disconnecting this cable will result in a loss of audio, but will not trigger a fault.



Fig. 5: Correct way of insertion of cable matching the red dot. Inset highlighting the protective cap of the cable



Fig. 6: Camera head cable connections

AUXILIARY DEVICE CONNECTIONS

Auxiliary equipment such as an ESU, insufflator or video recording equipment can be mounted on the vision cart by plugging them into the vision cart's isolation transformer and power strip (Figure 7).



Fig. 7: Power strip on the vision cart



Fig. 8: Back of surgeon console with MONO and BI receptacles

MONOPOLAR AND BIPOLAR FOOTSWITCH CONNECTIONS

Electrosurgical units (ESU) compatible with the system can be actuated after connecting the appropriate footswitch cable for the ESU to the “MONO” or “BI” receptacle on the back of the Surgeon Console (Figure 8).



Back of Surgeon Console

Fig. 9: Video connections on surgeon console

To connect an ESU to the system:

1. Plug the ESU end of the cable into the corresponding channel on the ESU.
2. Plug the system end of the cable into the appropriate connector on the back of the Surgeon console.

SURGEON CONSOLE VIDEO PATCH PANEL

The Surgeon Console video patch panel, located at the back of the Surgeon Console, (Figure 9) provides three video outputs (two mono, one stereo) for auxiliary video monitors, video recording, etc. and up to three video inputs for TilePro™ multi—image display. DVI inputs are currently disabled on the standard vision system.

OUTPUTS ON SURGEON CONSOLE

S-Video and composite outputs provide the patient side view including text and icons.

DVI output is available for both the left eye and right eye surgeon's view including text and icons.

The Surgeon Console service patch panel provides connectivity for service of the system.

VISION CART VIDEO PATCH PANEL

Auxiliary video inputs for the Surgeon Console's TilePro multi image display are provided in the Vision Cart video patch panel (Figure 10). The Vision Cart video patch panel also provides video signal outputs of the surgical view with text overlay for auxiliary video monitors, video recording, etc.



Fig. 10: Vision Cart Auxiliary Video Connectors



Fig. 11: Audio and Video connectors on back of vision cart

OUTPUTS ON VISION CART

S-Video and Composite outputs provide the Patient-Side view. There is already a S-Video breakout cable routed through the vision cart to provide S-Video output to an assistant/auxiliary monitor (if required) on top of the Vision Cart.

VISION CART AUDIO PATCH PANEL

The Vision Cart audio patch panel (Figure 11) provides audio inputs and outputs for connecting to the Surgeon Console and Patient Cart. These connections are used by the system's integrated intercom system.

RECORDING FROM THE SYSTEM

It is recommended to connect the output from the system to the same input format on the recording device. Use an S-Video breakout cable to connect the S-Video output from the system to most video recorders. If recording in the composite video format, a BNC to RCA adapter may be necessary.