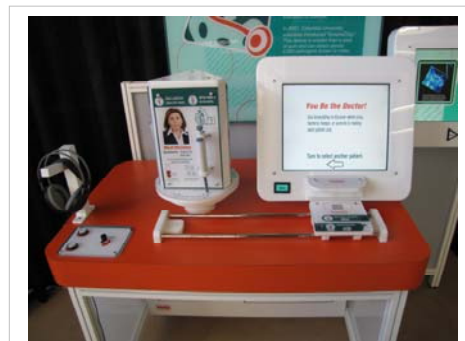
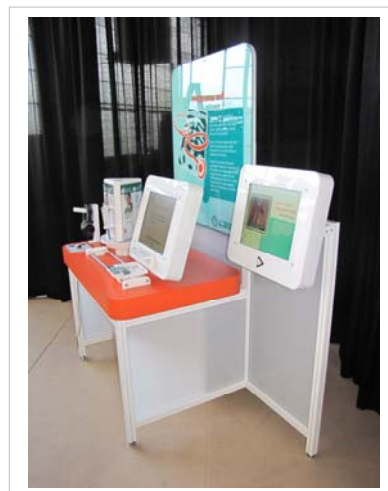


## Detecting Disease



### Exhibit Description:

“Detecting Disease” is a stand-alone interactive component of the *Nanomedicine* exhibition. A copy panel introduces visitors to some of the new ways of detecting and monitoring disease on the Nanoscale with genetic material. The flat screen to the right of the exhibit contains slides that highlight Nano diagnostic tools that are being used or are currently under development.

A computer/mechanical interactive, GreeneChip, demonstrates how a newly developed detection tool tests simultaneously for nearly 2,000 pathogens all at the same time. In this interactive, the visitor gets to conduct a lab test. They select one of three sick patients and use a real pipette to add the patient’s blood sample to a glass slide (the GreeneChip). A short animation zooms up close to show how tiny segments of pathogen DNA “stick” to the GreeneChip. The visitor then positions the GreeneChip under the scanner and presses scan. The correct diagnosis is then listed on the computer screen, and the visitor is invited to test another patient.

This exhibit component consists of one copy panel, the tabletop GreeneChip interactive, and a flat-screen monitor slideshow that can be updated to keep the exhibit content current and relevant. Like all of the exhibit components in the *Nanomedicine* package, headphone listening stations with both English and Spanish audio description labels are included. These audio labels serve two functions—to explain the “Big Idea” content of the exhibit and to provide illustrative descriptions of the interactive experience.

## Exhibit Interface:

### Interactive

- Screen instructs visitor to select one or three patients via the turnstile.
  - As the turnstile is rotated patient information is displayed on the interactive monitor.
- The visitor is then instructed to slide the “GreeneChip” under the turnstile and to depress the pipette.
  - Process animation starts – showing a sample being added to an enlarged GreeneChip and pathogen DNA sticking to the GreeneChip.
- Visitor is instructed to slide the “GreeneChip” under the “scanner” and press the “Scan” button.
  - “Scan” button becomes lit when slider is in the correct location, far right.
- Visitor presses “Scan” button.
  - “Scan” button goes dark.
  - Process animation starts - shows the Greene Chip being scanned.
  - Results are displayed on the interactive monitor.
- Instructions prompt visitor to slide the tray under turnstile and select a different patient.
  - Screen times out and goes back to attractor screen if another patient is not selected.

### Side Monitor

The monitor, on the right side of the interactive, displays images of nanotechnology.

- Images self scroll.
- Visitors can press the “Next” button to scroll to the next image.

### Audio

- Visitor wears the headphones.
- Visitor chooses to listen to English or Spanish by pressing the “English” or “Española” button.
  - Audio starts.
    - Audio explains the content of the exhibit
    - Audio provides instructions of the interactive.
- Visitors can adjust the volume of the audio.

## Exhibit Components:

The following lists of components combine to make the exhibit.

### Base Cabinet:

- Weighing, 100 lbs.
- Dimension, 57" H x 66" W x 32"D

### Graphic Panel:

- Weighing, 20lbs.
- Dimension, 34"H x 38" W x 2"D

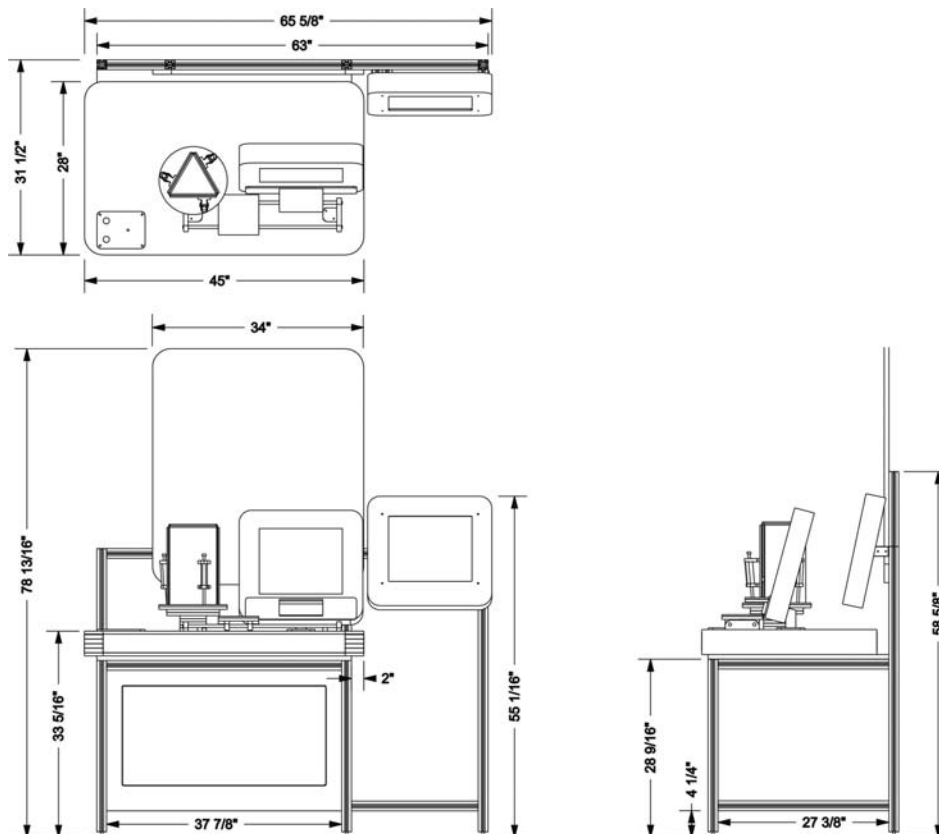
## Exhibit Specifications

### Dimensions:

- Exhibit Dimensions:
  - 79"H x 66"W x 31"D
- Exhibit Foot Print:
  - 66"W x 31"D
- Exhibit Floor Space:
  - 72"W x 62.5"D

### Power Requirements

- 110-volt, 15-amp.
  - Accessed through base cabinet of the exhibit



### Tools and Hardware:

Tools and Hardware needed for installation, maintenance and repairs to the exhibits.

#### Key

- 415-A
  - To open base cabinet.

#### Cam Wrench

- Cam locks
  - Securing Side Monitor to exhibit frame
  - Securing exhibit frame

#### 9/64" Allen Wrench

- All ¼ x 20 button head bolts
  - Securing the exhibit monitor to interactive cabinet
  - Securing the Graphic Panel to the exhibit frame

#### 5/32" Allen Wrench

- Security screws
  - Securing all second surface graphic panels

#### 3/32" Allen Wrench

- Machine screws that secure Side Monitor shroud

#### #2 Phillips Screwdriver

- Machine screws
  - Securing Side Monitor shroud back panel

#### 6" Crescent Wrench

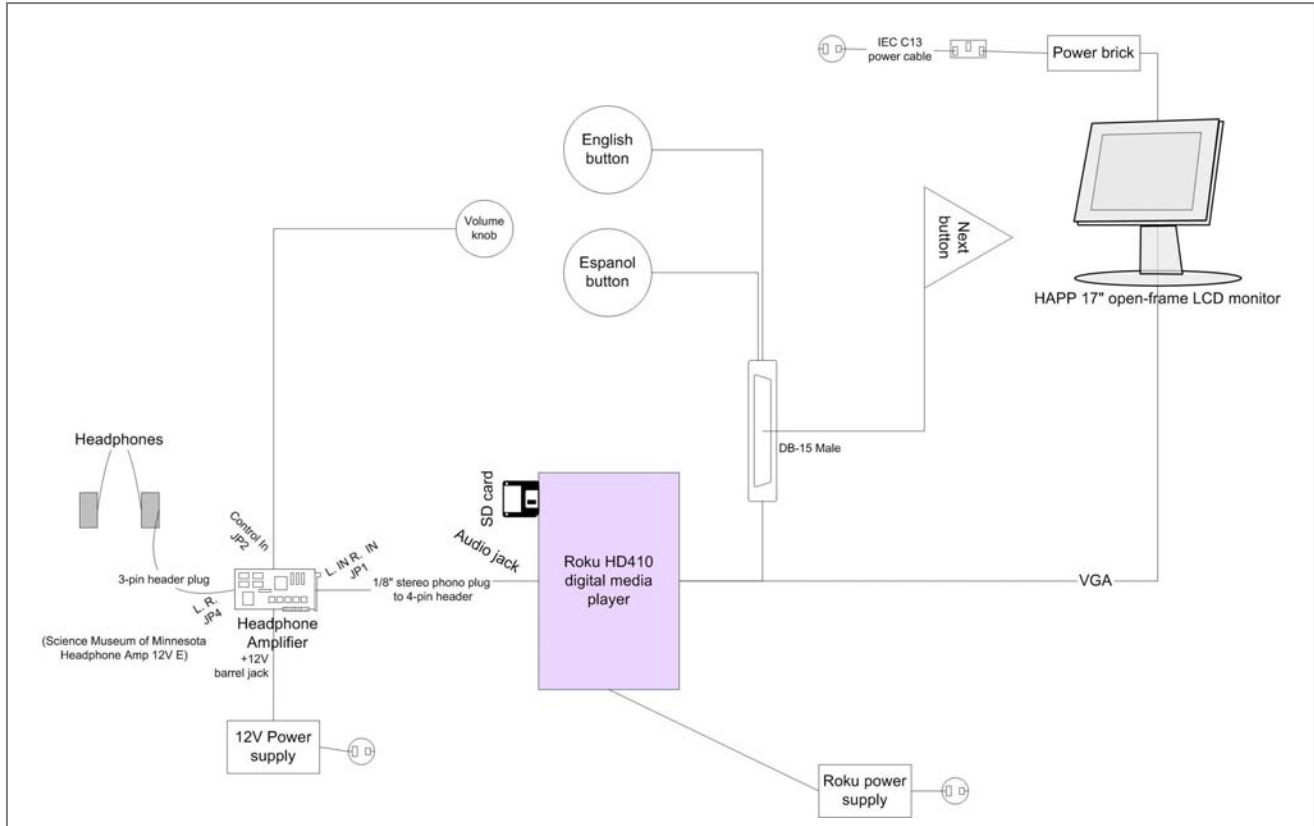
- To adjust leveling feet

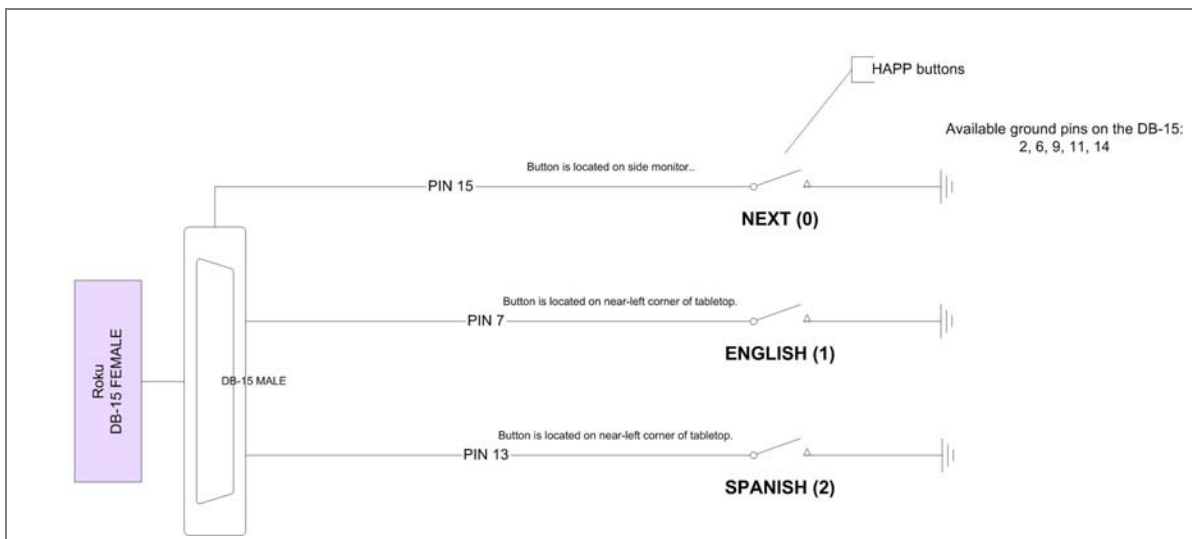
### Parts:

Parts needed for installation, maintenance and repairs to the exhibit.

- Headphones
  - AKG K77
- Monitor
  - 17" Happ, 49-2603-30
- Media Player
  - Roku HD410
- Amplifier
  - Produced by The Science Museum of Minnesota (SMM)
- Pipettes
  - Biohit Proline Fixed Volume Pipette, 722-030, [www.Pipetts.com](http://www.Pipetts.com)
  - Modified by The Oregon Museum of Science and Industry (OMSI)

**Media:**





### Electronics:

The electronics in the Greene Chip interactive exhibit consist of:

- A controller board
- A pipettes board
- Two magnetic sensors at the ends of the Greene Chip slide
- Three magnetic sensors beneath the rotating triangle
- A scan pushbutton
- A 12 VDC power supply
- A Roku digital media player
- A wall-wart power supply for the Roku

The pipettes board:

The pipettes board is mounted inside the rotating triangle. When the button on one of the pipettes is pressed, the microcontroller on the board wakes up, sends two pulses via an infrared led, and goes back to a very low power sleep mode. The pulses are seen by a phototransistor mounted on a stalk that extends up into the center of the axle about which the triangle rotates. The phototransistor is wired to the controller board below.

The two pulses are separated by an led-off time of 1mS. The on-time pulse width is 1 mS for the Michael side pipette, 2 mS for Larry or 3 mS for Christine.

The pipette board is powered by a #CR123A 3 V lithium battery commonly used in cameras. The battery should last for years.

-Continued next page-

### The controller board:

The controller board is mounted on a hinged panel which folds down from the underside of the table top. The controller receives IR pulses from the pipettes board, monitors the state of the five magnetic sensors and the scan button, and drives the LED in the scan button. It has a two-way serial link with the Roku player.

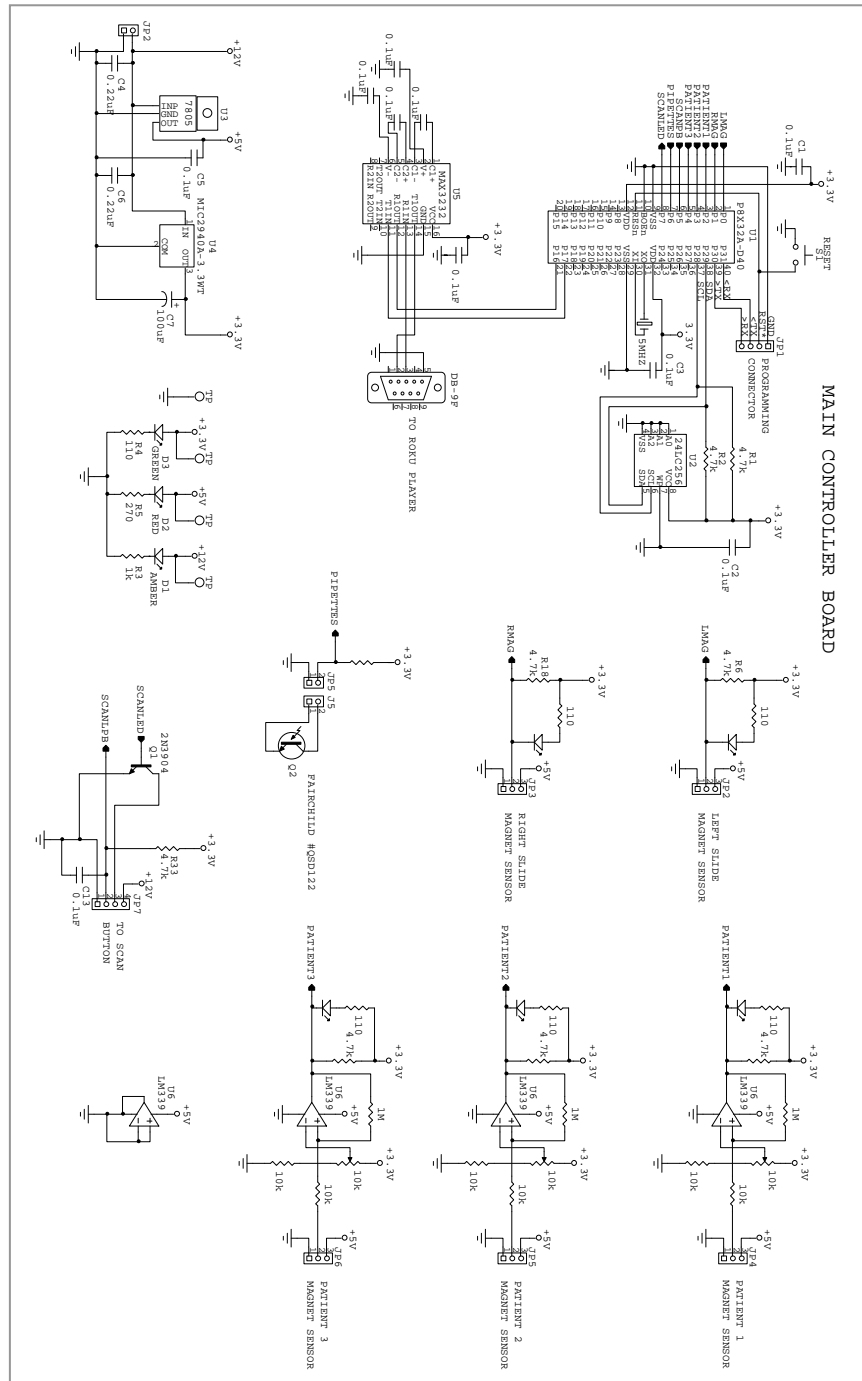
There is Hall Effect magnetic sensors in the white plastic blocks mounted between the rails at each end of the slide assembly. Magnets in the left and right edge of the sliding Greene Chip plate will trigger one on the sensors whenever the plate is moved to either end of the rails.

There are three are Hall Effect magnetic sensors mounted in the stationary disc beneath the triangular rotating assembly. A magnet in the rotating disc, above, will trigger one of the sensors whenever one of the flat sides of the rotating assembly is facing the front of the exhibit.

There are three additional magnets in the rotating disc and three in the stationary disc which act as detents. These are independent of the position sensing but, when the rotating assembly is in a detent position, the position sense magnet should also be aligned with one of the sensors.

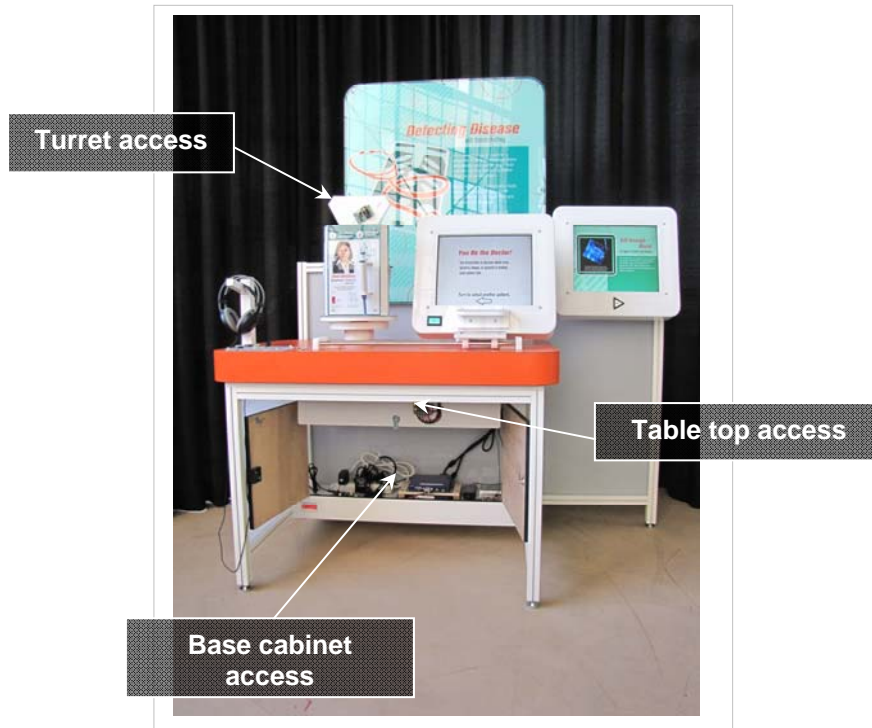
### Program flow:

If the activity is started and abandoned, the exhibit will time-out and return to the attractor screen. Apart from this time-out, which is managed by the controller, the timing of the activity is driven by the controller's communication with the Roku player. The controller sends a character to the player, which causes it to execute a section of a script stored in the player. Depending on the character sent, the player will display a still frame or play a video file. When the player has finished displaying the frame or video, and waited for any additional time dictated by the script, it echoes the character it received back to the controller.



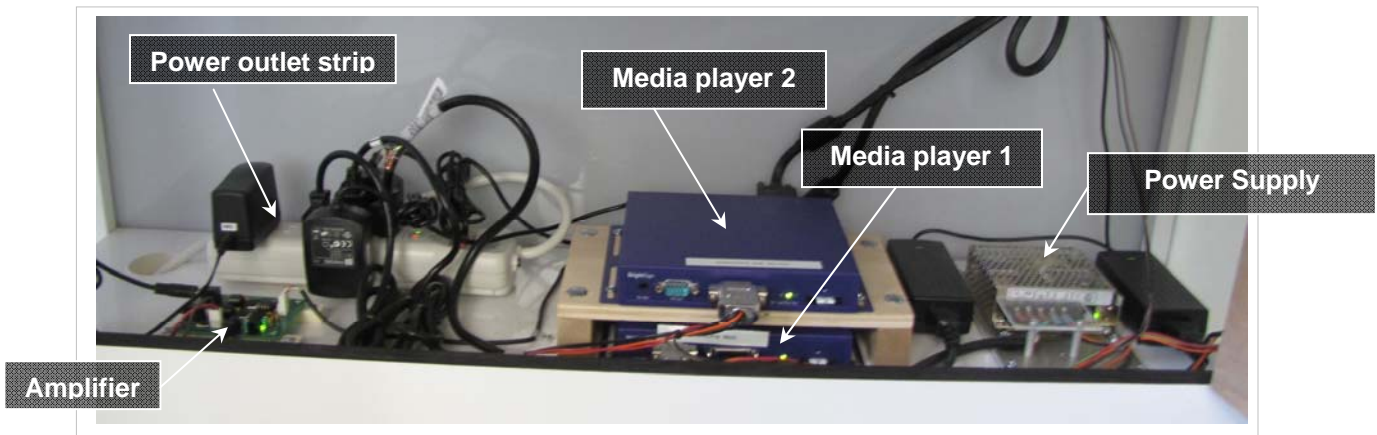


## Service Access



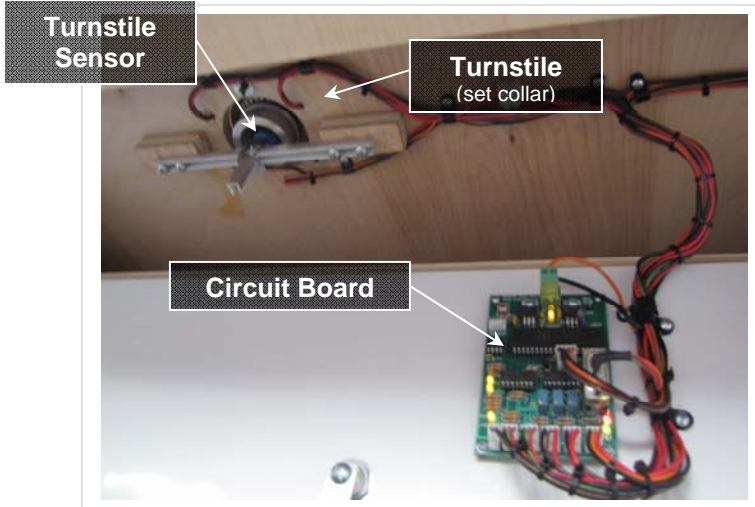
### Base Cabinet access

- Accessed with a 415-A key
- Contains
  - Power Outlet Strip
  - Media player 1, the interactive monitor media player
  - Media player 2, the side monitor media player
  - Audio amplifier
  - Power supply



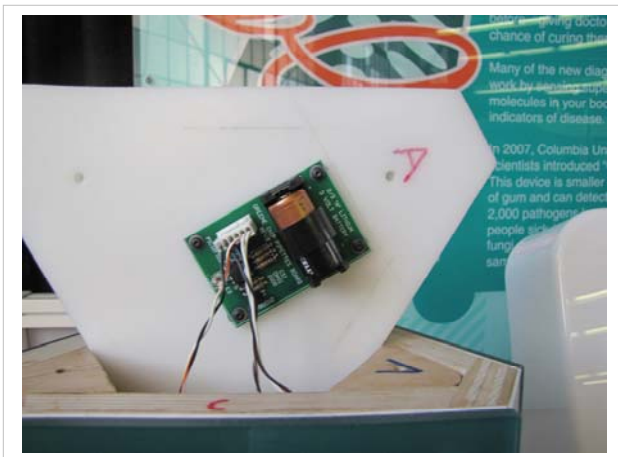
### Interactive access

- Accessed with a 415-A key
- Contains
  - Interactive circuit board
  - Turnstile set collar
  - Turnstile sensor



### Turret access

- Contains
  - Interactive circuit board
  - Battery
  - Turnstile sensor



## Trouble-Shooting

### Interactive:

- No Picture on Interactive Monitor.
  - Ensure there is power to the exhibit.
  - Ensure power strip is switched to the “ON” position.
  - Check to ensure all power plugs are connected to power strip and to the back of the Monitor.
  - Check to ensure source plug is connected to the media player and to the back of the Monitor.
  - Check to ensure media card is securely inserted into the media player.
- ➔ **If the above conditions are met the media card, media player, or side monitor may be faulty, replace as needed.**
  
- Monitor images do not advance with turnstile.
  - Ensure turnstile set collar is secure.
  - Ensure sensor stem is aligned correctly.
  - Check to ensure all source plugs are connected.
  - Check the battery within turnstile.
- ➔ **If the above conditions are met the battery may be faulty, replace as needed.**

### Side Monitor:

- No Picture.
  - Ensure there is power to the exhibit.
  - Ensure power strip is switched to the “ON” position.
  - Check to ensure all power plugs are connected to power strip and to the back of the Monitor.
  - Check to ensure source plug is connected to the media player and to the back of the Monitor.
  - Check to ensure media card is securely inserted into the media player.
- ➔ **If the above conditions are met the media card, media player, or side monitor may be faulty, replace as needed.**
  
- Pictures do not advance when prompted.
  - Check to ensure all plugs are securely connected to the “NEXT” and “HOME” buttons and the Signal cable is securely connected to the media player.
  - Check to ensure media card is securely inserted into the media player.
- ➔ **If the above conditions are met the media card, media player, or buttons may be faulty, replace as needed.**

### Audio:

- No Sound
  - Check to ensure all plugs are securely connected to the amplifier.
  - Check to ensure plugs are securely connected to the “ENGLISH” and “ESPANOLA” buttons and the Signal cable is securely connected to the media player.
  - Check to ensure media card is securely inserted into the media player.
- ➔ **If the above conditions are met the media card, or buttons may be faulty, replace as needed.**