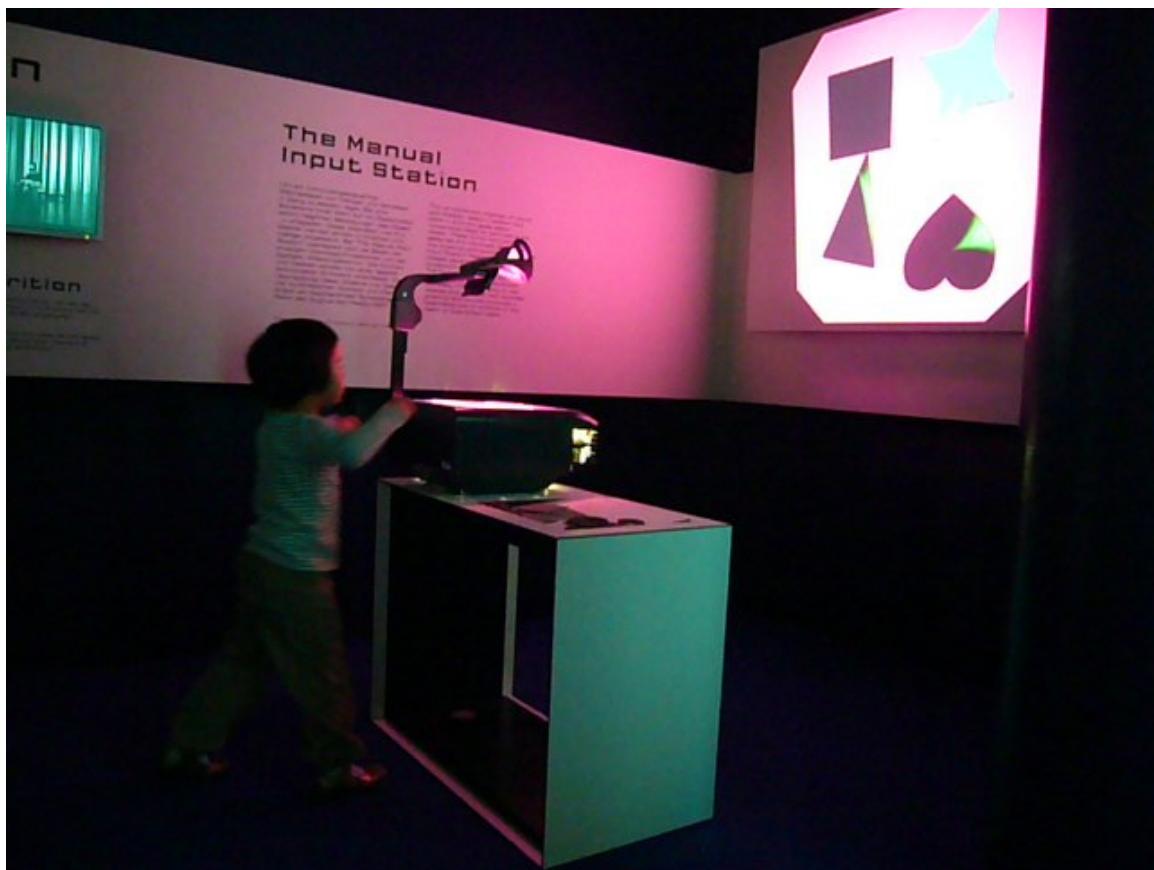
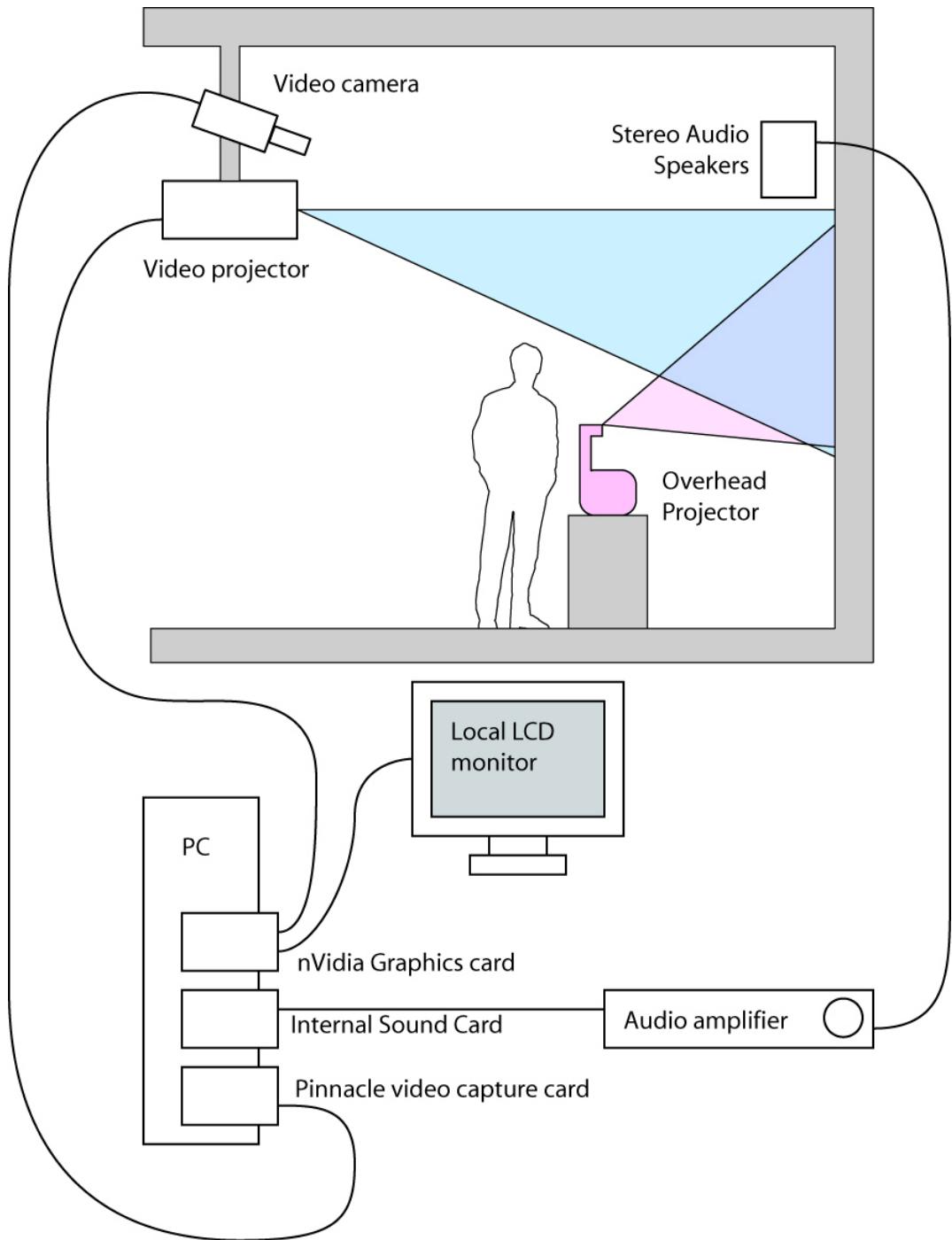


Installation Instructions for “The Manual Input Sessions”

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Installation Schematic Diagram



Please note that the computer, amplifier and LCD monitor should be stored in a remote equipment closet. They should not be displayed near the exhibit.

Required Equipment

The exhibiting institution must provide:

- PC Computer, 3.0Ghz+ or Dual2.2Ghz+ Intel CPU
 - We recommend and prefer desktop computers from Dell or HP
 - WindowsXP English recommended but not required
 - 512 MB RAM, 40GB HD
 - nVidia GeForce 7400+ graphics card with 2 outputs (DVI & VGA)
 - *It may be helpful to have a wireless keyboard!!*
- Video projector, 3000+ ANSI Lumen, DLP, 1024x768 native resolution
- Ceiling-mount system for video projector
- 15" LCD screen (1024x768), for administrative purposes only
- Stereo sound system (powered speakers + amplifier)
- Stereo audio cables (PC to amplifier)
- 1 long coaxial 75-ohm BNC video cable (20 meters?) (for Camera to PC)
- 1 12-volt DC adaptor, 500 millamps (*not a switching adaptor!*)
- 1 long VGA cable (20 meters?) (for PC to video projector)
- 1 short VGA cable (2 meters) (for PC to LCD screen)
- Special pedestal construction (details in this document)
- Overhead Projector (“OHP”) of a specific type. See details on next page!
- Spare lamps for Overhead Projector.

We have provided:

- Sony SSCM-183 B&W Security Camera with IR filter (“camera”)
- Bogen/Manfrotto Camera Clamp with Quick-Release Head (“clamp”)
- Pinnacle PCTV video capture PCI card for PC (“video capture card”)
- Rosco #349 Fischer Fuchsia pink gel sheet
- Special cardboard numbers and shapes

Exhibition Room Requirements:

We require a medium-dim room with *no daylight*.

The light level in the room should be constant, and not fluctuate significantly.

The Correct Overhead Projector

The Overhead Projector (OHP) must be a traditional analog electric transparency projector. This projector must have a large hollow body in which the table top is also a glass (Fresnel) lens. A good example is the 3M 1820, 3M 1850, or **3M 1880**. These projectors look like this:



There are many different manufacturers and models for overhead projectors. It is OK to use an older OHP (from the 1960's or 1970s) if it is clean and working well. The most important properties of the OHP we need are:

- **Transmissive** (not reflective)
- We prefer “**Doublet**” lens
- About **2000-3000 Lumens** of brightness
- 10.5-11 inch stage

For an explanation of these terms, please see:

http://www.3m.com/meetingnetwork/products/product_guide_overhead.html

So, I recommend an Overhead Projector in the 3M series, like the **3M 1880**, hopefully with a brightness of 2000 to 4000 Lumens. If you cannot get 3M, there are other brands that work, but please check with us first. It is important that the projector is of the correct kind, as I have already emphasized.

You will also need to get a spare lamp (lightbulb) for the OHP! This is especially important for long-term exhibitions (more than a few days).

BAD OVERHEAD PROJECTORS:

There are some kinds of OHP that will NOT work properly with our artwork. The following kinds are ***VERY BAD***; please ***DO NOT*** get projectors similar to these:



NO: “Reflective” type (not transmissive)



NO: Electronic Video Presenter



NO: Electronic Video Presenter

Preparing the Overhead Projector

Now we assume that you already have the correct type of overhead projector. Even so, there are still one or two small modifications which must be made.

Installing the pink color sheet into the OHP.

One of the packages provided to you contains a sheet of pink plastic gel. This sheet is Rosco Fischer Fuchsia #349; it is what makes the project appear pink. Usually this kind of gel sheet is used to make colored illumination for theater lights. In *The Manual Input Sessions*, this pink color helps improve the contrast and visibility of the digital video graphics.

The pink color gel is fragile and should be handled carefully:

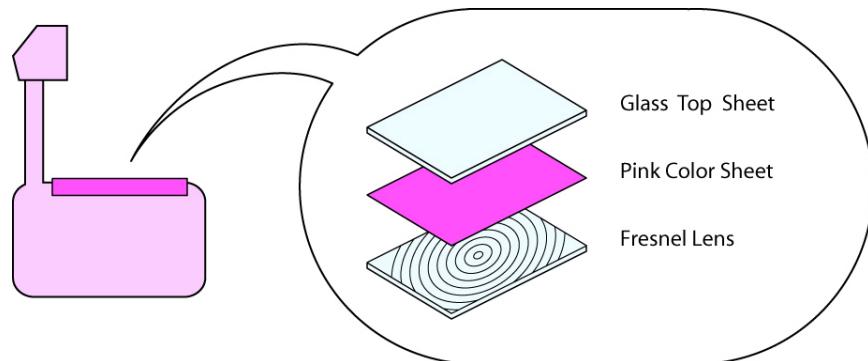
- Avoid getting fingerprints on the surface.
- Always handle it carefully so it does not crinkle or fold.

Overhead projectors usually have two sheets of glass:

- The topmost sheet is plain glass and is just protective.
- Underneath that is a special “lens” sheet of glass – the “Fresnel lens”, which is a flat sheet of glass with circular grooves everywhere.

You will need to insert the pink gel between the two sheets of glass -- a sandwich. The exact details of this depend on your Overhead Projector. But the steps are:

1. Disassemble the top shell of the Overhead Projector. Carefully separate and remove the Fresnel lens and the top sheet of glass. Pay attention to how these glass sheets are clipped into the projector shell.
2. Cut the pink gel (with scissors or a mat knife) so that the piece of gel is slightly larger than the top opening of the OHP. This way only pink light will show through.
3. Insert the pink sheet between the top glass and the Fresnel lens, and screw everything back together.



(MAYBE) Removing the Infrared Filter from the OHP.

NOTE: This step may not be necessary!

Not every OHP has an Infrared Filter. In fact, most OHPs do not. Occasionally, however, the Overhead Projector has an Infrared Filter which must be removed in order for the installation to work properly. We have only seen this problem very rarely – only on some of the newer OHPs from Japan. If you are installing the project in Japan, Korea or elsewhere in Asia, this step may be necessary. The purpose of the OHP's Infrared Filter is to reduce the heat coming out of the OHP table. Unfortunately, heat = infrared light, and we require this light in order for the installation to work!

Here are the steps to remove the Infrared Filter:

- 1. Check: IS there a filter that needs to be removed from the OHP?** You will know if the OHP has a filter because (later on) our Infrared camera does not see the image of the projected light from the OHP. Also, usually, the glass platform of a normal OHP should feel hot, or very warm. If the glass does not feel very hot, then maybe the OHP has an Infrared Filter.
- 2. Open the OHP case.**
- 3. Inside the OHP, just above the lamp, look for a *glass square*.** If you see a glass square which is about 8x8cm, slightly bluish or bluish-silver, that's the infrared filter! Remove it from the OHP.
- 4. Re-assemble the OHP.**

Positioning the Projectors

There is a special relationship between the physical positions of the Overhead Projector and the Video Projector. This relationship depends on the specific optics of the two projectors, and the dimensions and location of the projection screen.

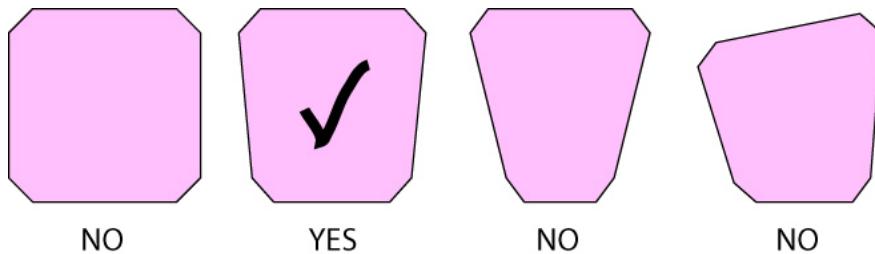
Positioning the projectors correctly is a trial-and-error process which must be determined on-site using the actual equipment. It should be done as early as possible in the installation process, once you have obtained both projectors. You do *not* need to have the software running yet on the computer, in order to determine the position of the projectors.

To position the projectors correctly, *you will need*:

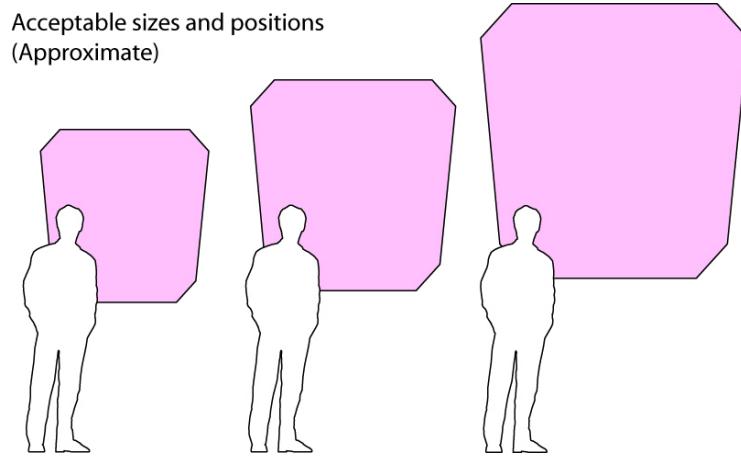
- The Overhead Projector (OHP) – 2000-3000 Lumens
- The Digital Video Projector (DVP) – XGA. (1024x768), 3000+ Lumens
- The pedestal/table for the OHP
- The mounting equipment for the DVP
- The screen or wall on which the image will be projected
- Colored tape, to mark the floor.

To position the projectors correctly, *follow these steps*:

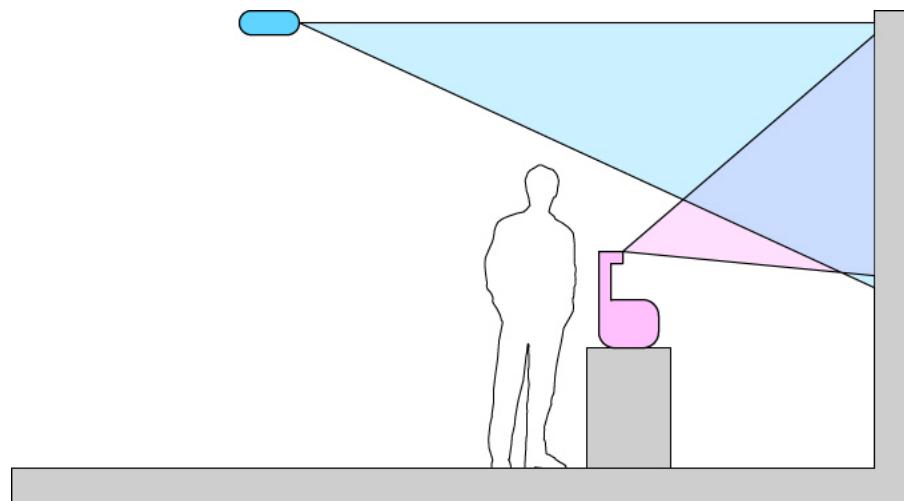
1. Turn on the OHP and point its light at the desired projection screen or wall.
2. Theoretically, the OHP produces a “square” image. However, usually the image is somewhat trapezoidal (warped from perspective). *This is OK!!* In fact, this is actually an important part of the project. The OHP image should be somewhat trapezoidal, but *not extremely* trapezoidal.
3. It is best if the OHP trapezoid is symmetrical in the left-right direction.



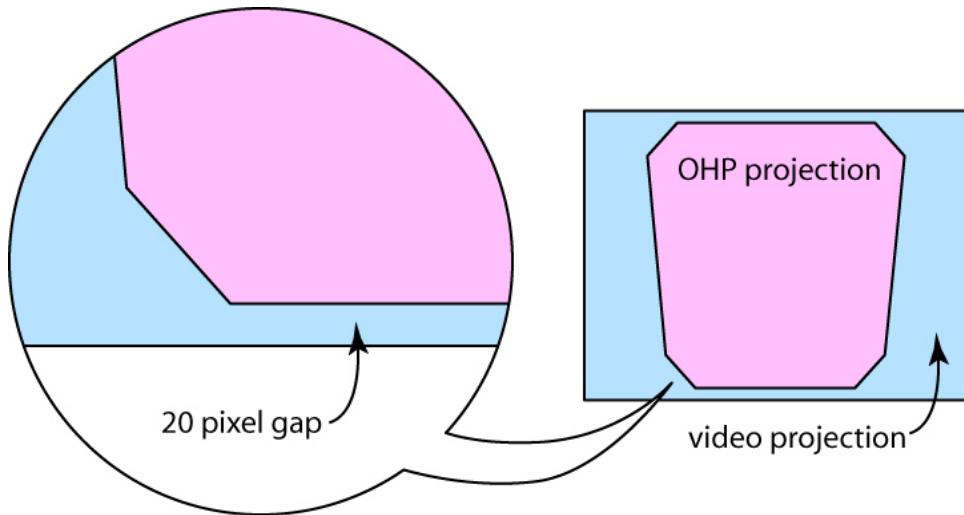
4. Now we want to get the size, position and focus of the OHP image correct.
 - a. *Size*: the OHP image size should be roughly 200x200 centimeters. It could be as small as 140x140, or as large as 220x220 – somewhere in that range, depending on your room.
 - b. *Position*: the bottom of the OHP projection should be approximately 110-160 centimeters from the floor.
 - c. *Focus*: Make sure the edges of the OHP image are focused and crisp.



5. Now that the OHP image is correctly sized and positioned, we have to position the digital video projector (DVP) in relation to it. Turn on the DVP so that it is projecting a blank rectangle. At this stage, you don't need to have a computer attached, but if you want, you can show the PC desktop.
6. Set the zoom of the DVP lens to the center of its range. This way we have room to zoom in or out as necessary.
7. As a first guess for the location of the digital video projector, do this:
 - a. The lens will probably be a few centimeters above the height of the OHP image. If the top of the OHP image is located at 300cm from the floor, the DVP lens will probably be around 310cm from the floor.
 - b. For the most common kind of equipment, the DVP will be approximately twice as far from the projection screen as the OHP. So if the OHP lens is 200cm from the screen, the DVP lens will be approximately 400cm from the screen. This depends a lot on the optics of the projectors. Of course, it will not be true for DVPs with wide-angle lenses. I am assuming a "regular" DVP with a throw-ratio of 1.8-2.2:1.



8. Now that you have approximately placed the DVP, it is time to make an accurate placement. Our goal is as follows: **The video projection should completely contain the OHP projection, with a little bit of margin.** In other words, the OHP projection on the screen/wall should be completely inside the video projection.



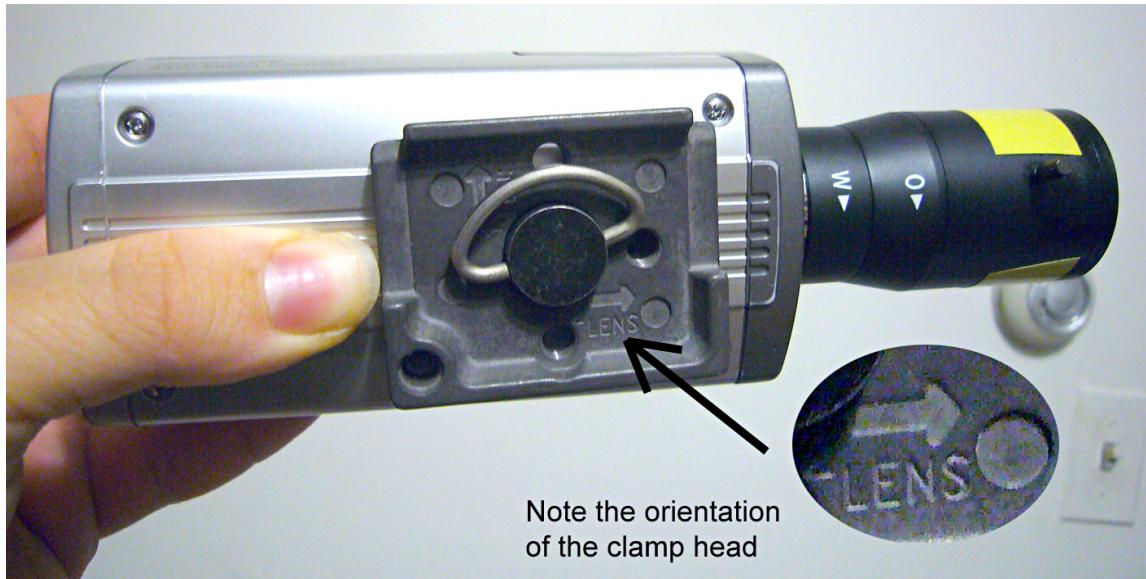
9. To be really precise, it is best to have approximately 15-20 pixels of margin above and below the OHP image, at the top and bottom of the digital video image. It may be helpful to adjust the zoom factor on the DVP. If you cannot fit the OHP image inside the DVP image, move the DVP further away from the projection screen.
10. Focus the digital video projection and check your results.

Installing the Video Camera: Camera Clamp

The video camera is mounted just above the video projector. The camera is fixed in place using the provided Camera Clamp (Bogen/Manfrotto Super-Clamp with Quick-Release Head):



When attaching the camera to this clamp, make sure the clamp head is correctly oriented:



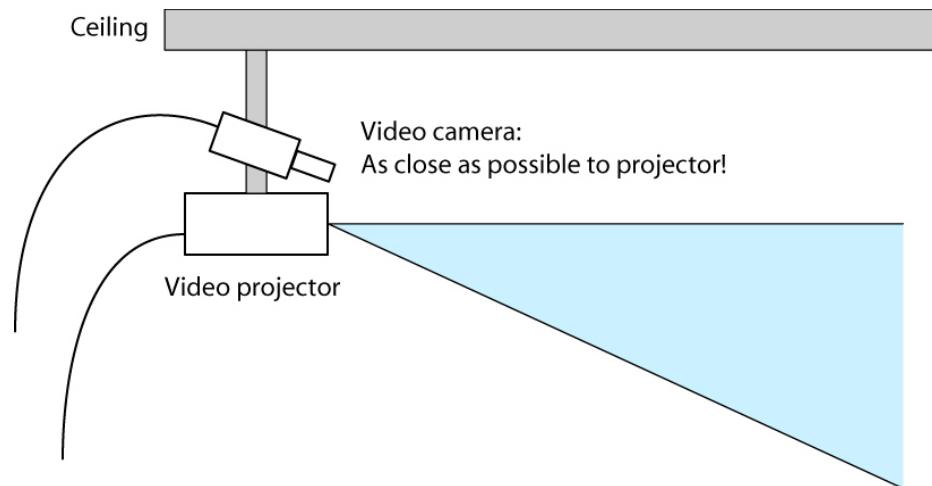
You should also make sure that the brass pin is in the Locked position (closed) after the camera is attached. This will help secure the camera:



Positioning the Camera (Coarse Adjustment).

The camera should be located just above the video projector. Try to put the camera lens as close as possible to the video projector lens – ideally, closer than 10cm. Point the camera at the image produced by the Overhead Projector.

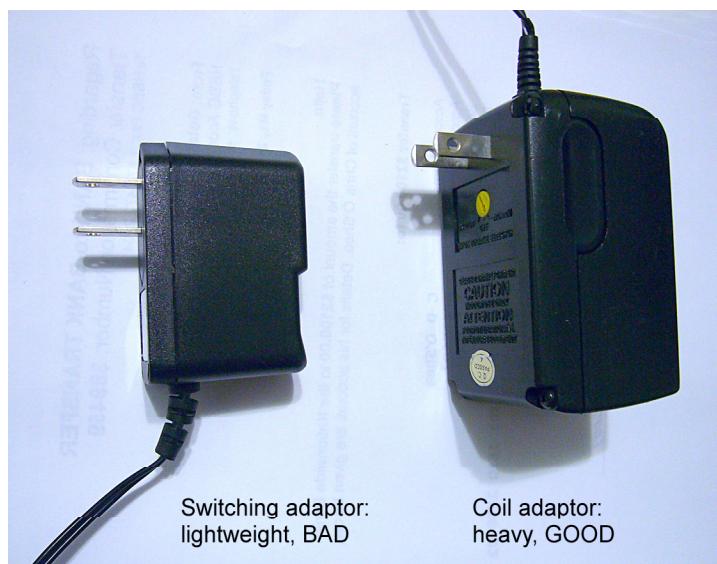
This is just a coarse adjustment for now. We will do a precise adjustment when we run the installation software.



Powering the camera.

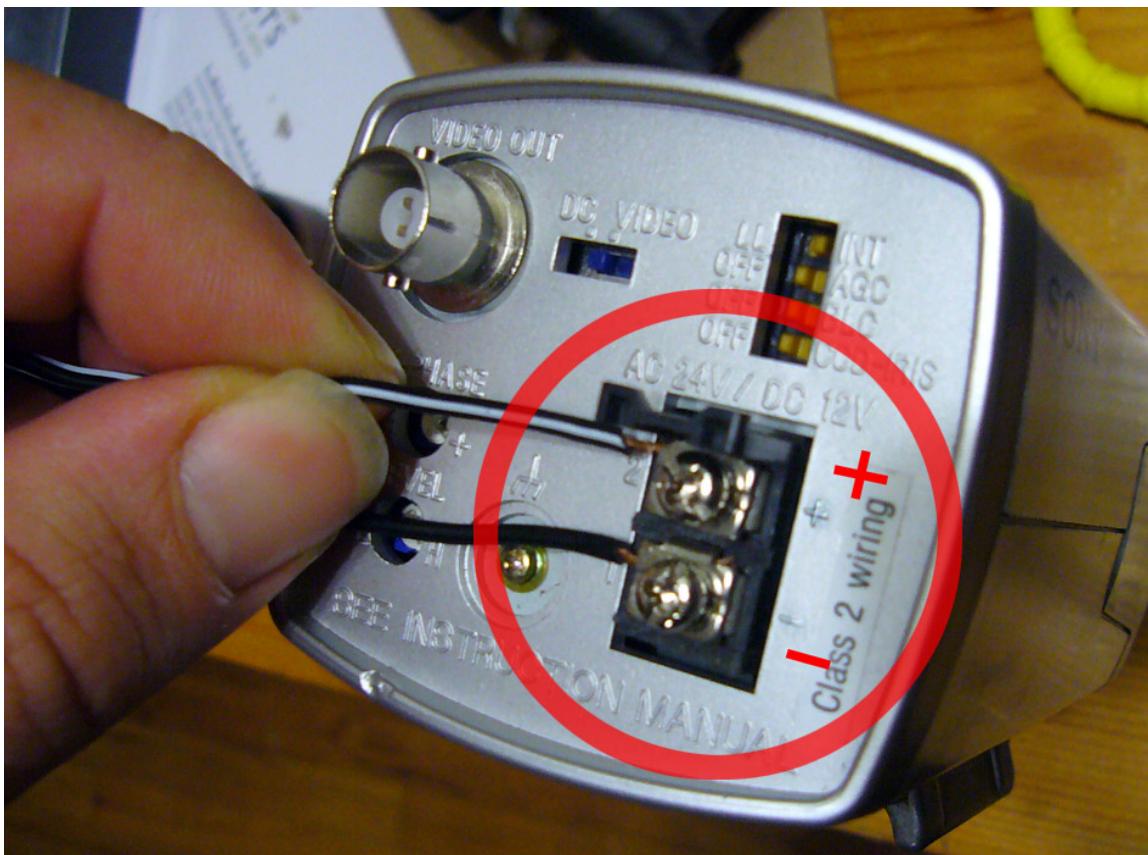
You will need to provide the camera with 12V DC power, 500 mA.

- Please use a “coil adaptor”. These are heavy and produce good-quality current.
- Please **DO NOT** use a “Switching Adaptor” – These small lightweight adaptors produce bad-quality electricity and should *not* be used with video cameras!



Now you have obtained the 12 volt DC adaptor, 500 mA.
When powering the camera, please note that one terminal is marked (+).
Please pay attention to polarity when connecting the camera to power.

If necessary, use a volt-meter to determine which wire from the adaptor is (+).
Sometimes, the (+) wire has a white stripe, like in the picture below.



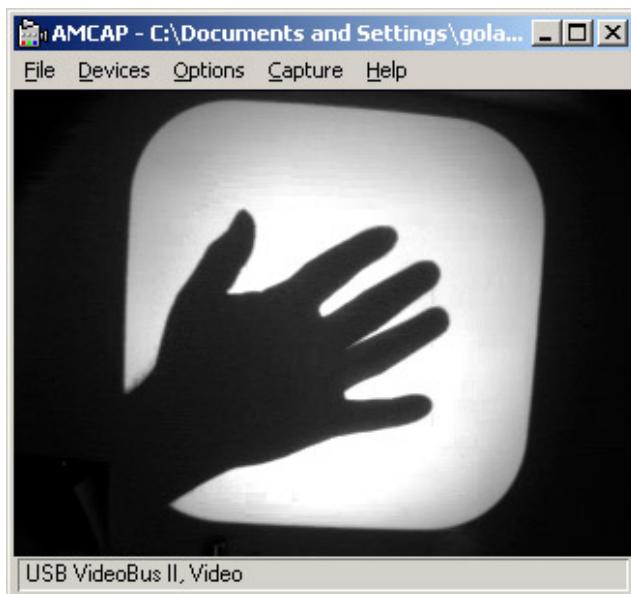
Installing the Video Capture Card, and Testing the Camera

To test the camera quickly, you could just connect a TV. The camera is NTSC. However, we should really test it on the computer. Here are the steps:

1. Install the Pinnacle PCTV Video Capture Card into the PC's PCI slot.
2. Install the provided driver: **PinnaclePCTVUpdate550.exe**
3. Make sure the camera is powered
4. Connect the camera to the video input of the PCTV card.
 - a. Use a long (20-meter) coax video cable (with BNC connectors, 75ohm)
 - b. **You will need a BNC-to-RCA adaptor**, such as this one:



5. Launch the provided test program “**Amcap.exe**”. This is a test program which is very useful for making sure that the camera is successfully being captured by the video digitizer.
6. You should now see the video signal from the camera. (Please note that my OHP has round edges, but yours may not!)



7. If you are not seeing the camera image in AmCap, you may need to adjust some software settings:
 - a. Make sure the “Video Standard” is set to NTSC-M. Go to AmCap>Options>Video Capture Filter.
 - b. You may also need to set the Input to “Video Composite In”. Go to AmCap>Options>Video Crossbar.
8. Now adjust the camera’s zoom, position and aperture:
 - a. **Zoom:** Get the entire image of the OHP projection into the camera view.
 - b. **Position:** Try to center the OHP image in the camera view. Some error is OK! The artwork software will correct for this during the calibration process described later.
 - c. **Aperture/Iris.** Try to get a clean image like the one shown below: mostly black and white. You can adjust the iris ring on the camera lens. If necessary, you can also adjust some of the brightness/contrast settings in AmCap.



NO



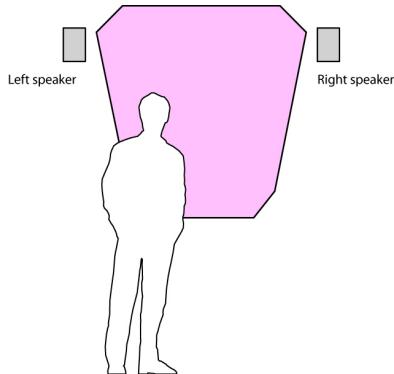
YES



NO

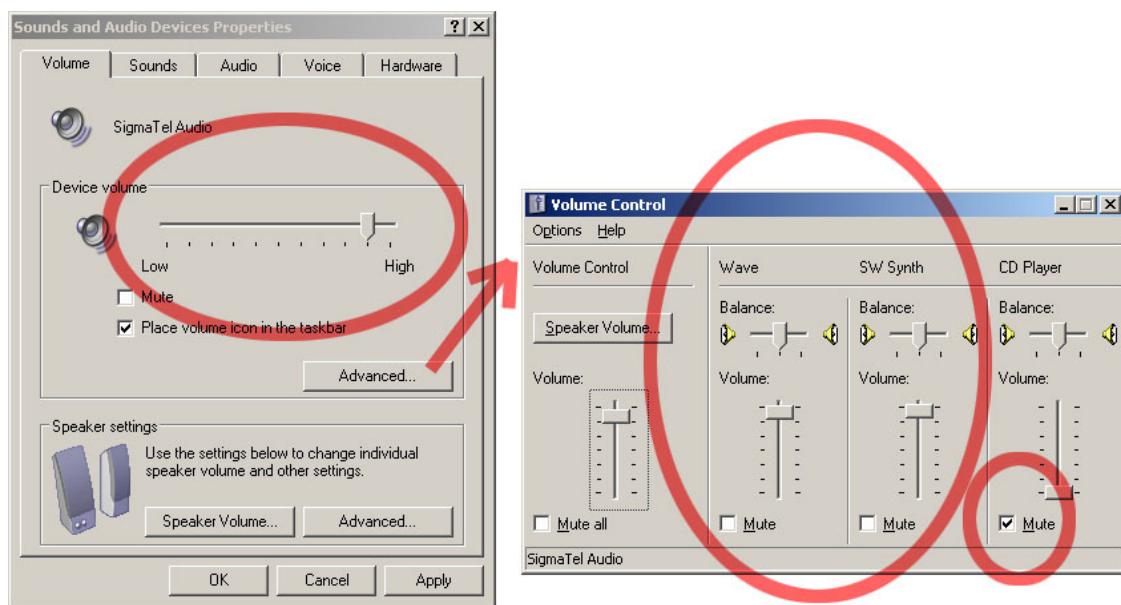
Installing the Sound System

The *Manual Input Sessions* produces stereo audio from the PC's sound card. The spatialization of the audio is important to the project: images on the left side of the screen produce sounds on the left side of the screen; images on the right make sounds on the right. Thus, to make the most convincing audio, the speakers should be hung on the sides of the projection screen.



Steps for installing the audio system:

1. Hang the left speaker near the left side of the screen, and hang the right speaker near the right side of the screen.
2. With the appropriate cabling, connect the computer's audio output to the amplifier, and the amplifier to the audio speakers.
3. Adjust the software volume of the PC for the best signal-to-noise ratio. Go here: Start→Settings→Control Panel→Sounds and Audio Devices→Volume→Advanced, then: **set** the “Wave” and “Software Synth” settings high (not all the way), and **mute** the other volumes.



Preparing the Computer: Settings & Control Panels

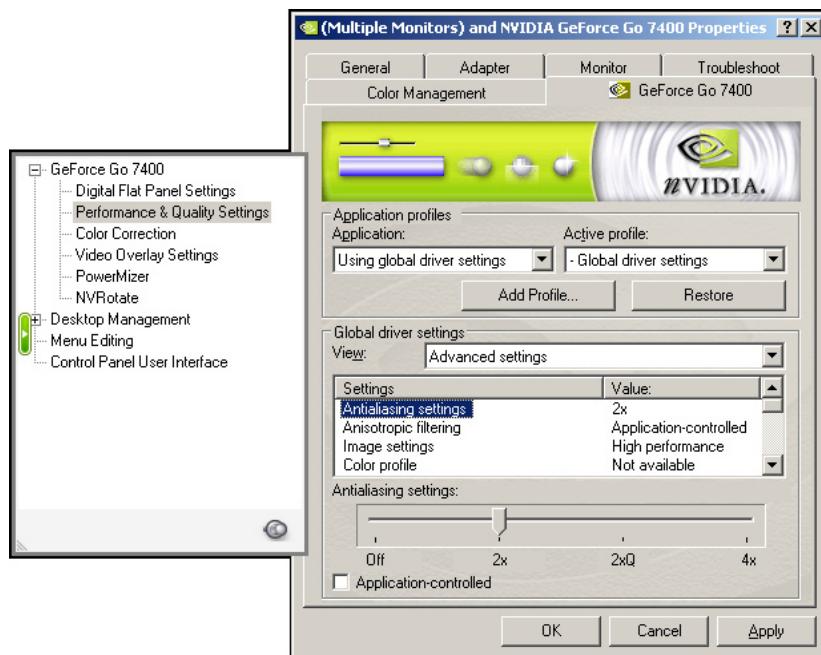
A. Settings for the nVidia GeForce graphics card

It is essential that the graphics card is **nVidia GeForce**. If it is not, there has been a big mistake. Please make sure there is an nVidia card in the PC!

If the installation of nVidia drivers is very new on this PC, then when you open the graphics control panel for the first time, you will need to choose the correct nVidia Control Panel: “Classic” or “New”. I prefer the “Classic”; please use this one.

- Right-click on Desktop, choose Properties;
- Choose the Settings Tab, Click “Advanced” button;
- Go to the GeForce Tab.

If you have both the projector and the LCD connected to the graphics card, then go to the **nView options** and select “Clone”. This way the LCD will mirror the video projector. Be *careful*: If you only have one display plugged into the PC, then the **nView options** won’t show up.



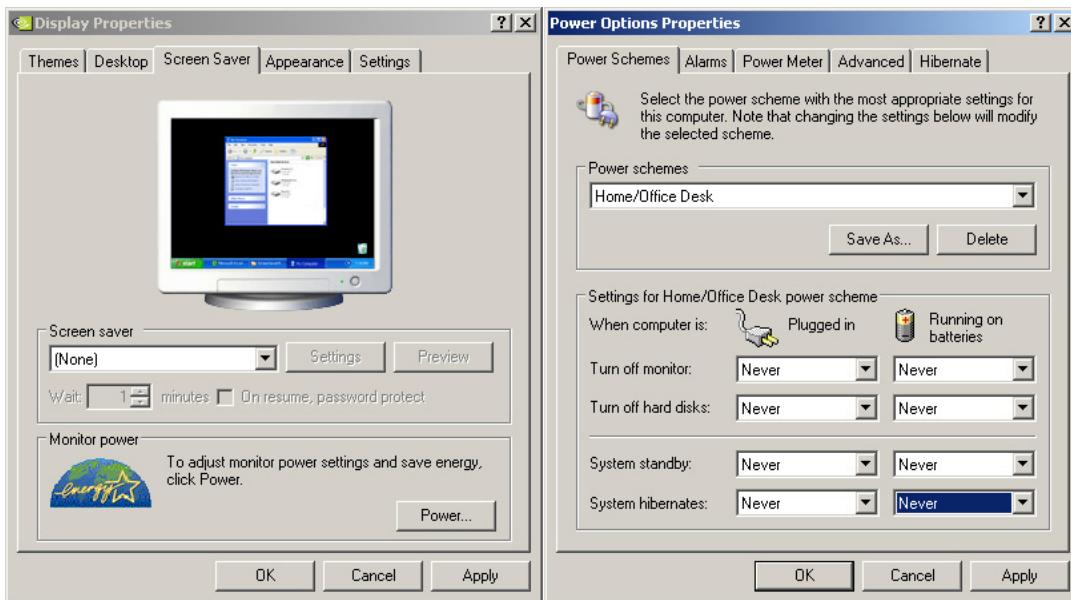
Under “Performance and Quality Settings”:

- For Application profiles, choose “Using global driver settings”.
- For Active Profile, choose “-Global driver settings”.
- For Global Driver Settings, choose “Advanced View”.
 - For “Anti-Aliasing Settings”, choose “On” with a value of “2X”.
 - For “Anisotropic Filtering”, choose “Off”.

- For “Image Settings” choose “High Performance”.
- For “Vertical Sync” choose “Off”.
- Trilinear Optimization = On
- Anisotropic mip filter optimization = On
- Anisotropic sample optimization = On
- Transparency anti-aliasing = Off
- Triple-Buffering = On

B. Settings for the Screen Saver / Power Mode

Right-click on Desktop, choose Properties; Choose the “Screen Saver” tab. Make sure the “Screen saver” is set to “(None)”. Then press the “Power...” button, and make sure that all of the power scheme options are set to “Never”.



C. Please disable the Windows “Notification Area Balloon Tips”

- Click Start, click Run, type regedit, and then press ENTER.
- Navigate to the following subkey:
HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced
- Right-click the right pane; create a new DWORD value; and then name it: EnableBalloonTips
- Double-click this new entry, and then give it a hexadecimal value of 0.
- Quit Registry Editor. Log off Windows, and then log back on.
These steps disable all Notification Area balloon tips for this user!

Installing the *Manual Input Sessions* Software; Some Basic Information About the Software

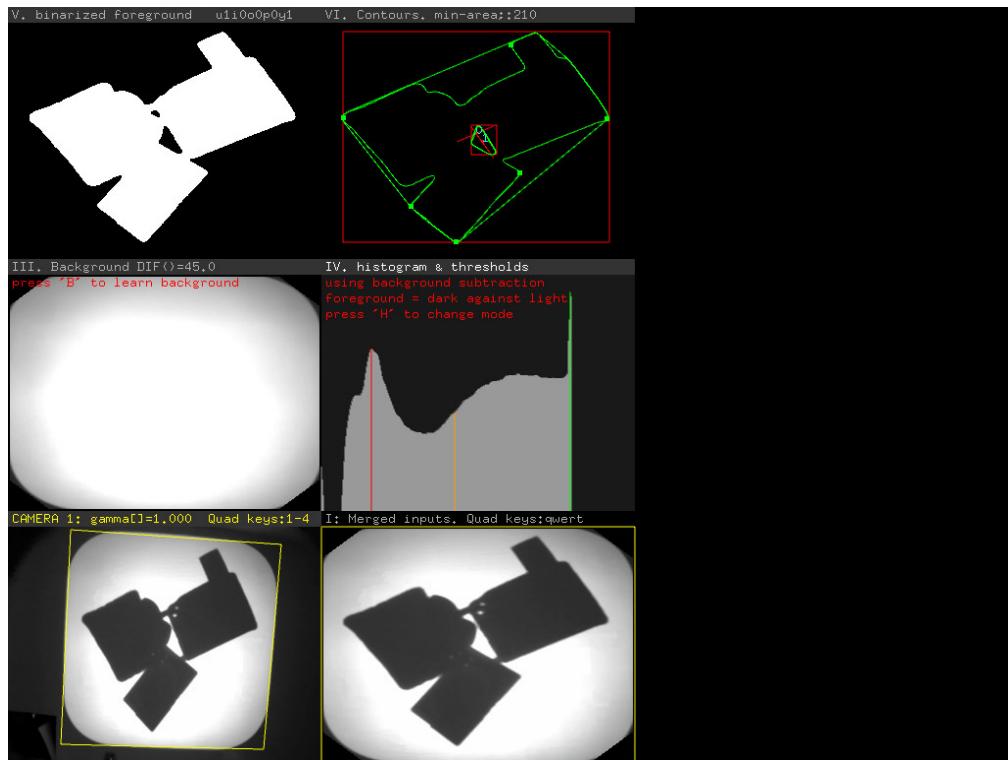
The “Manual Input Sessions” program is in the folder called “artwork”. To run the software, just double-click on the item, “**manual_input_sessions.exe**”.

SUMMARY:

- ‘v’ key – switch between Diagnostic and User modes.
- ‘b’ key – re-learn the Background Image
- ‘S’ key (shift-S) – saves all settings
- Space bar – clear the virtual objects in User Mode

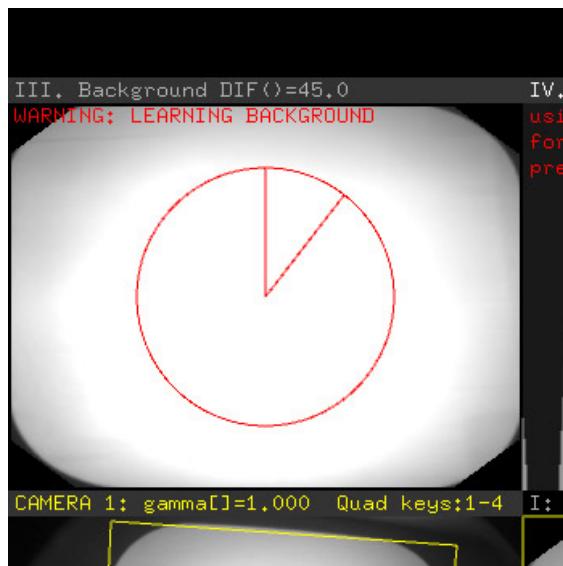
SOME ESSENTIAL INFORMATION – PLEASE READ!!!!!!

1. The software has 2 modes: **Diagnostic** Mode and **User** Mode.
 - a. Diagnostic mode shows the camera input and other information.
 - b. User mode shows the artwork for visitors.
2. The program automatically starts in Diagnostic Mode when you launch the software. This lasts for 60 seconds, and then the program switches to User mode.
3. **If you need to go between the two modes, press the ‘v’ key.**



Screenshot of Diagnostic Mode. The “background” is the mostly white image.

4. The Artwork uses “Background Subtraction” in order to identify objects on the OHP. To do this, the artwork compares the live camera image with a stored image of the “plain” background which it has “learned”. **It is very important that the background have no objects in it when it is learned.** The learned background is shown in the middle image on the left side of the Diagnostic screen. The background should always look like a mostly white rectangle!
5. The background is learned each time when the program is started up. It looks like the image below, with a little clock circle. *During the “background learning” time, do not put any objects or hands into the light of the OHP! If you start the software fresh each day, make sure to remove all of the objects from the OHP first!*

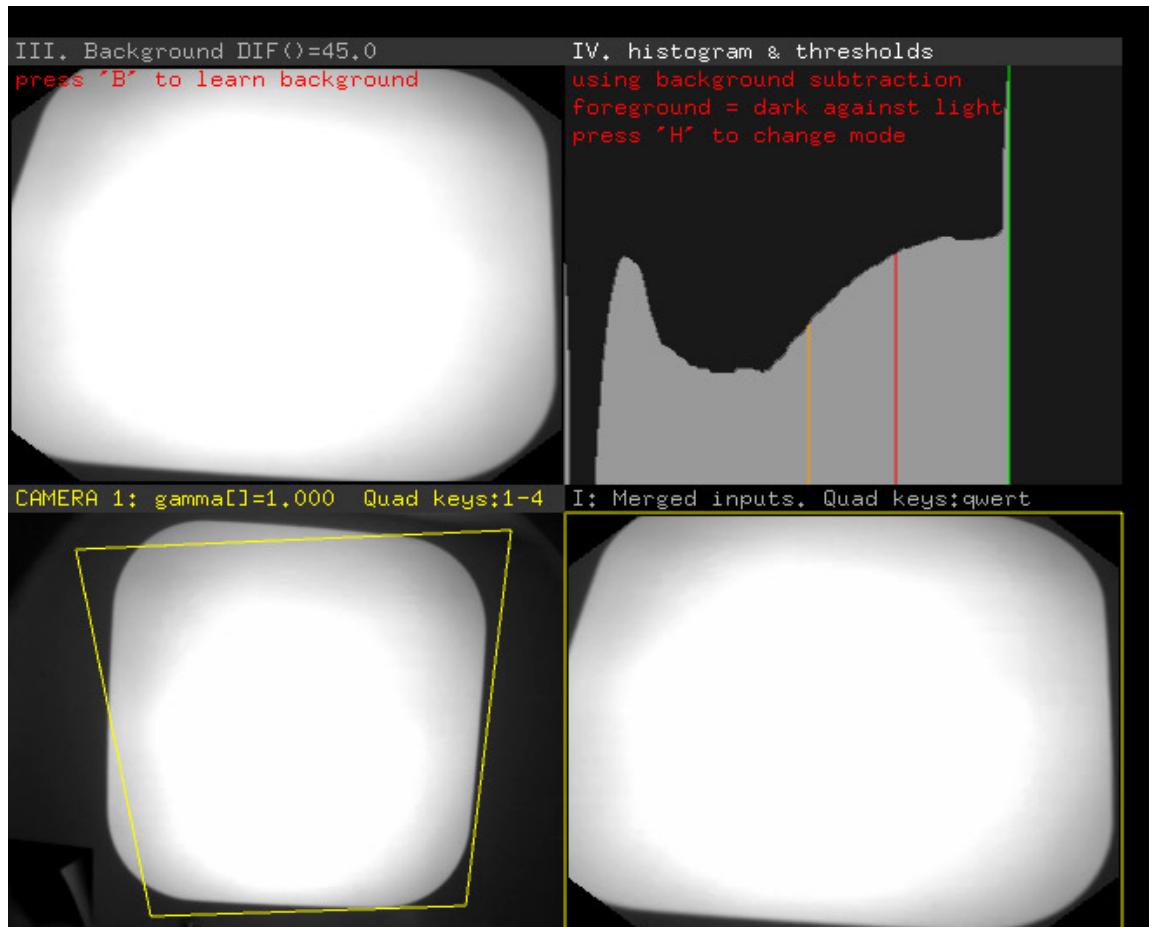


6. Sometimes you might need to re-learn the background. This could happen for the following reasons:
 - Someone put an object on the OHP while the background was being learned.
 - Someone bumped into the OHP and everything got slightly shifted or moved.
 - The lighting in the room suddenly changed very dramatically
7. If you need to re-learn the background, press the ‘b’ key.

Calibrating the Manual Input Sessions Software

A. Calibrating the Camera.

The first time you run the *Manual Input Sessions* software, you will need to calibrate the “Camera Selection Quadrilateral”. This is the Yellow Rectangle in the lower left corner of the screen:



As you can see, this yellow quadrilateral is not yet adjusted for the OHP. To correct this, you will select each corner and move it to the correct location. Here are the steps:

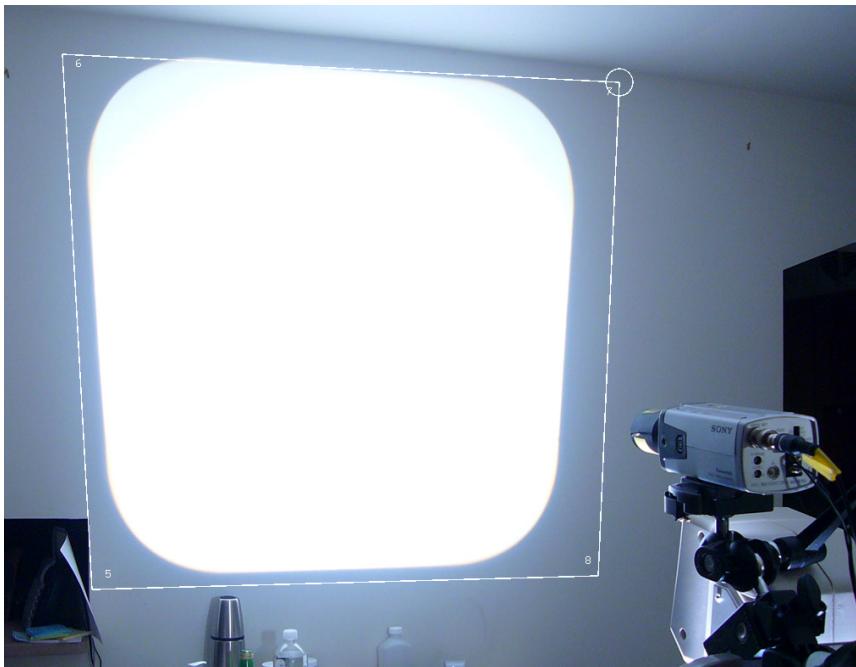
1. Press the ‘1’ key on the keyboard. You will see a circle around the lower right corner of the yellow quad. Now use the mouse to position the corner so that it is adjusted for the OHP.
2. Press the ‘2’ key; you can now adjust the lower left corner the same way.
3. Press the ‘3’ key; you can now adjust the upper left corner the same way.
4. Press the ‘4’ key; you can now adjust the upper right corner the same way.

5. Press 'S' on the keyboard (Shift-S). **THIS SAVES YOUR SETTINGS!** It is very important to save these settings or you will lose them! You only need to save them once, unless something gets moved accidentally.
6. Do another pass around the 4 corners to refine your calibration.
7. When you are done, the yellow quadrilateral should look like this – fitting snugly around the OHP image:



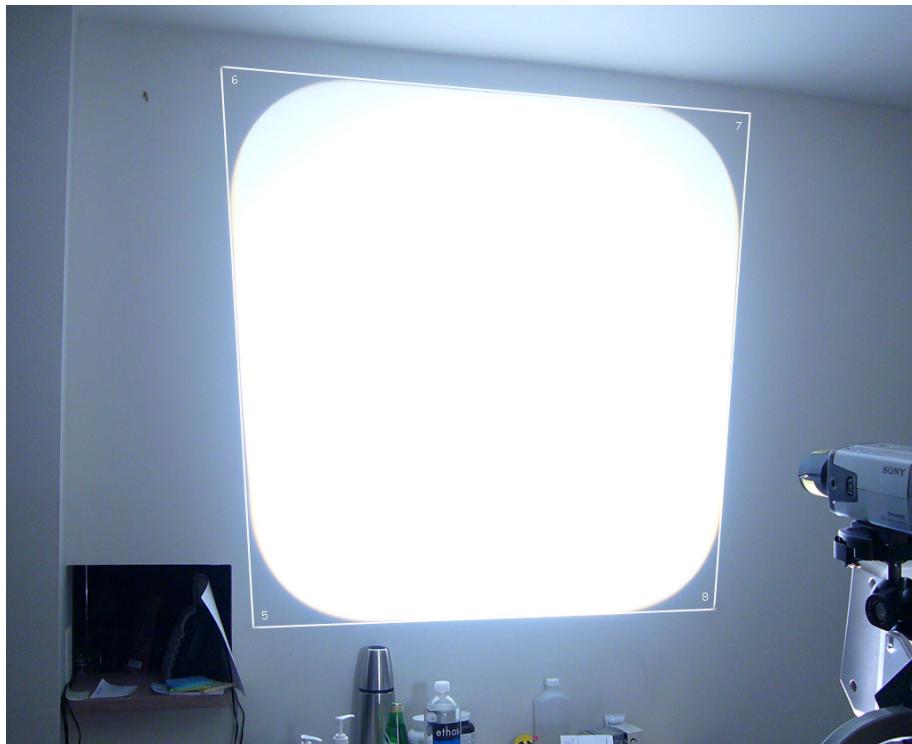
B. Calibrating the Video Projection

The first time you run the *Manual Input Sessions* software, you will need to calibrate the Video Projection to the OHP image. The procedure is similar to the last one. This time, we need to calibrate a *projected* quadrilateral with the *real* OHP image.



Here are the steps:

1. Make sure that the video projector is turned on, and that it is showing the computer signal.
2. It may be very helpful to have a wireless keyboard or long USB extension for your keyboard right now! You must simultaneously be near the installation, but also have access to the keyboard, in order to calibrate this setting!
3. If you are currently in Diagnostic Mode, press 'v' to exit that and enter into User mode.
4. Press '9'. This will show the Projection Quadrilateral. Actually, '9' is a toggle key for this quadrilateral, so you can use it to turn that information on or off.
5. Now press '5'. The lower left corner will get a circle around it. Now you can adjust that corner with your mouse, until it fits snugly around the real image from the Overhead Projector.
6. Press the '6' key; you can now adjust the upper left corner in the same way.
7. Press the '7' key; you can now adjust the upper right corner in the same way.
8. Press the '8' key; you can now adjust the lower right corner in the same way.
9. **Press 'S' on the keyboard (Shift-S). THIS SAVES YOUR SETTINGS!** It is very important to save these settings or you will lose them! You only need to save them once, unless something gets moved accidentally.
10. Press the '9' key again to hide the projection quad. Your quad should now be snugly arranged around the OHP image:



Calibrating the Scene-Switch Numbers.

You have been provided with some wooden numbers. These are used by the visitors in order to switch scenes. (The artwork has 3 scenes.) The numbers look like this:



THIS IS VERY IMPORTANT:

To switch scenes, a visitor should put the number down on the OHP for a few seconds, and then remove it.

Your museum has been provided with 2 sets of numbers.

- **One set is a spare. Do not exhibit both sets at the same time.**
- Please use sandpaper to smooth the edges of the numbers!
- Please paint the numbers black.

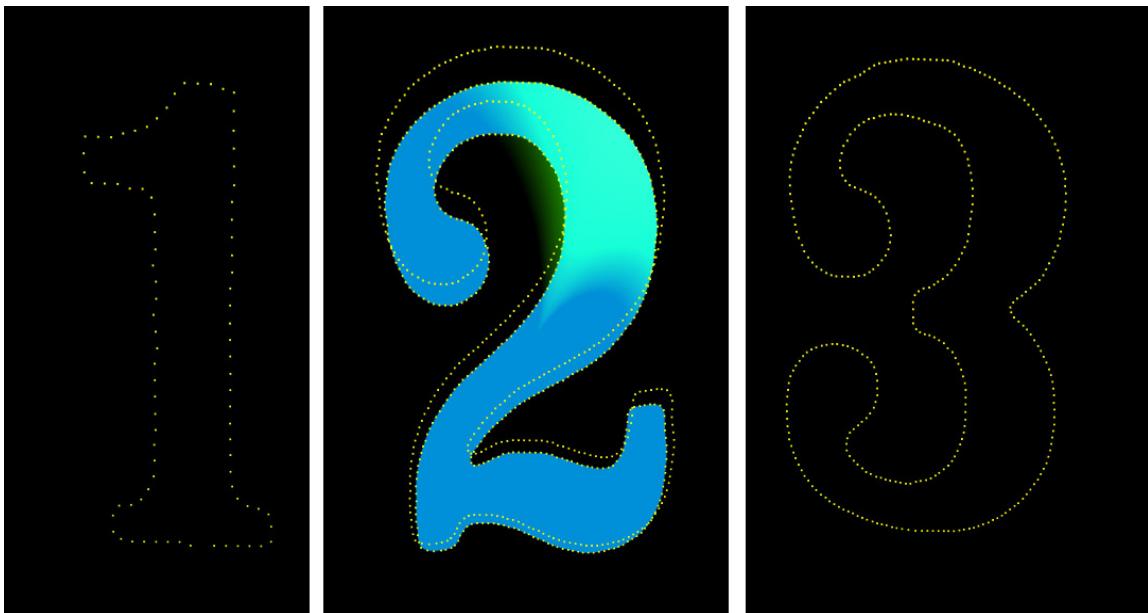
CALIBRATION of the NUMBERS

In order for the numbers to work properly, they must be “learned” or calibrated by the computer. This only needs to happen once. Here are the steps:

1. While running the *Manual Input Sessions* software,
2. Press ‘v’ to exit the diagnostic mode, if you are in it. Enter User Mode.
3. Put the # 1-piece onto the OHP. Turn it so that it reads correctly in the projection.
4. **Press the key ‘w’.** This will save the information for the #1 piece.
5. Put the # 2-piece onto the OHP. Turn it so that it reads correctly in the projection.
6. **Press the key ‘e’.** This will save the information for the #2 piece.
7. Put the # 3-piece onto the OHP. Turn it so that it reads correctly in the projection.
8. **Press the key ‘r’.** This will save the information for the #3 piece.

Each time you put a number-piece down, from now on, it will switch the scene shown in the artwork. The numbers should be removed from the OHP after they have been used to change the scene.

You will know that the numbers are successfully working because you will see a special “indicator outline” which looks like this:



To better understand the different scenes, please watch the DEMO VIDEO which came in the software delivery.

Finally: Locking Down the Equipment

THIS IS VERY IMPORTANT. In order to work properly, the artwork depends on one major assumption. It assumes that the OHP image will *never* move in relation to the camera.

If the OHP image can move even a little bit, the difference can cause significant errors in the behavior of the software! Therefore it is necessary to lock everything down so that it cannot move. Specifically, you must lock down the following 4 things:

1. **The pedestal must be locked down to the floor.** It should not be possible to shift or adjust the position of the pedestal on the floor. For example if someone accidentally kicked the pedestal, it should not move.
2. **The Overhead Projector must be locked down to the pedestal.** It should not be possible for a visitor to shift or adjust the position of the OHP on its table/pedestal. How you accomplish this will depend on the specific OHP model you have. It may be necessary to disassemble the OHP slightly, drill holes in its base, and then connect the OHP to the pedestal with several threaded bolts.
3. **The Overhead Projectors' optics (lens and mirror) must be fixed so that they cannot move.** Most OHPs have adjustable lenses and mirrors which can be raised, lowered, and/or tilted. Once the OHP is in its finalized location, and focused correctly, you should devise a way to keep its optics from moving. For example, it should not be possible for a child to play with the lens/mirror and move it into a new position. How you accomplish this will depend on the specific OHP model you have. One solution is to drill some holes in the hinges of the optic mounts, and insert some screws there. If the screws are placed correctly, they will act as "pins" that prevent the hinges from opening or closing.
4. **The projection screen/wall should be fixed in place.** If you are projecting on one of the walls of the room, this is not an issue. But if you are projecting onto a suspended screen, it is important to ensure that the screen does not move around. Lock its position with extra cables, and make sure that the screen is far away from the foot traffic of young visitors.

Please see the following diagram to quickly understand what needs to be secured.

Things to lock down:

1. pedestal
2. projector
3. optics
4. screen

