IMPORTANT

These assembling instructions are provided only as a reference for the assembling of the ED-projector system. Please refer to expert help to make sure that the system complies with safety standards, in particular, to guidelines for installation and maintenance of electrical systems.

Disclaimer: IBM is not responsible for any accident or injury resulting from the manufacturing, assembly, or use of the machine described in this manual. The information contained in this document should be regarded simply as a suggestion for the assembly and manufacturing of the system. Please consult an electrical and mechanical engineer to certify the safety of the built system.

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1 Projector

1.1 Part List

Computer 1:
- 900MHz or better, 500Mbytes or more of RAM
- NVidia Quadro2 MXR, AGP, two VGA analog outputs (US$ 250.00)
- 2 serial ports
  - OR 1 dual serial card for Windows 2000 (around US$ 50.00)
  - OR 1 serial port + Belkin USB Serial Adapter, part number F5U103, with cable F2N209-06 (US$ 79.00)
- Windows 2000

Projector basic equipment:
- SHARP XG-P10XU (US$ 6452.00, old quote from www.sbcg.com)
- Star Light & Magic’s Elipscan (DMX controlled mirror attachment) (US$ 400.00) http://www.meteor-usa.com/Meteor-elpiscan-fixture.html (some cutting and re-assembly needed, see manufacturing manual)
  - OR Rosco I-Cue Intelligent Mirror (US$ 560.00) + Rosco PSU-02 Power Supply Unit for I-Cue (US$ 112.00)
- Artistic License DMX Dongle II (DMX interface to computer) (US$ 600.00) from www.artisticlicenice.com
- Custom-made mounting structure (see manufacturing manual)
- (2) Avenger C1600 jaw clamp (from B&H) (US$40.00)

Cables/connectors to connect mirror to (from www.barbizon.com) DMX Dongle II
- (Elipscan) XLR5male/XLR3female cable converter (for DMX)
  - OR (Rosco) XLR4male/XLR3female cable converter (for DMX)
- (Elipscan) XLR5female/XLR3male cable converter (for DMX)
  - OR (Rosco) XLR4male/XLR3female cable converter (for DMX)
- (2) DMX cable, XLR 3pin male/XLR 3pin female connectors (long enough to connect projector to computer 1)

Cables/connectors to connect projector to computer 1 (from radioshack, etc)
- straight serial cable, DB9 female/DB9 male connectors (long enough to connect projector to computer 1)
- null modem adapter, DB9 female/DB9 male
- VGA cable extension DB15male/DB15female (long enough to connect projector to computer 1)

Parts for sensor of lens/focus position, from www.usdigital.com
- Absolute encoder sleeve bush for SEI (US$283.50) (part # AD2-S-SNT)
• SEI to serial adapter with power supply (US$100.00) (part # AD2-B)
• 6pin silver satin cable (part # CA-824FT) (long enough to connect projector to computer 1)
• 2way 6conductor SEI modular jack adapter (part # CON-MD6-2J) (if you need to connect two or more of the 6pin cable)

1.2 Projector Cabling

Connecting the mirror (Elipscan):
Cables:
• DMX dongle
• XLR 5 pin to 3 pin adapters (5pin male- 3 pin female, 5pin female- 3pin male)
• (2) XLR 3 pin extension cables
• power cable of the mirror

Instructions:
The DMX dongle connects to parallel port. To provide power for the Dongle, disconnect the keyboard cable, connect it to the Dongle, and connect the Dongle keyboard cable to the computer’s keyboard (PS/2) connector. Connect the power cable of the mirror to the mirror, and using the adapters and the extension cables, make a loop from the Dongle that contains the mirror control.

Connecting the mirror (Rosco):
Cables:
• DMX dongle
• XLR 4 pin to 3 pin adapters (4pin male- 3 pin female, 4pin female-3pin male)
• (2) XLR 3 pin extension cables
• power cable of the mirror

Instructions:
The DMX dongle connects to parallel port. To provide power for the Dongle, disconnect the keyboard cable, connect it to the Dongle, and connect the Dongle keyboard cable to the computer’s keyboard (PS/2) connector. Connect the power cable of the mirror to the mirror, and using the adapters and the extension cables, make a loop from the Dongle that contains the mirror control.

Connecting the projector (Sharp):
Cables:
• serial port adapter cable (comes with the projector)
• extension serial cable, male-female
• null modem adapter
• VGA cable

Instructions:
Connect the serial port adapter to the serial port connection of the projector. Then connect the null modem adapter, and to this the serial extension cable. Connect the extension cable to COM1 of computer 1.
Connect the VGA cable from "input1" in the projector to 2nd head connector in the computer graphics board.

Connecting the angle encoder:
Cables:
- serial port to SEI Bus adapter cable
- SEI Bus cable (similar to phone cable)
- power cable, SEI Bus adapter

Instructions:
Connect the SEI Bus cable to the angle encoder (the black cylinder mounted on the front of the projector). This cable runs to the SEI Bus adapter. The adapter has to be connected to power and also to COM2 port of the computer.

1.3 Computer, Projector, and Mirror Setup

Setting up the monitor:
1. From the "start menu", select "Settings", and "Control Panel". Double-click to open the "Display" icon from the list.
2. Click on the "Appearance" tab. Select from "item", the item "Background". Set its color to black.
3. Click on the "screen saver" tab. Select "none". Also, set "energy savings/settings/system stand by" to "never" and "turn off monitor" to "never".
4. Click on the "Settings" tab. Click on "Advanced", then the "Dual-head" tab. Set "Dual-head" to "Multi-display". Set 2nd monitor to be True Color (32 bits), 1024x768. Make sure that the first monitor is also set to True color (32 bits), 1024x768. Check the box corresponding to "extend my windows desktop to this monitor".
5. After clicking OK, and exiting the "display" application, reboot the machine.

Setting up the mirror:
1. Move all dip switches (the two sets) to the “off” position.

Setting up the projector:
1. Turn on the projector, select "input1" from the projector menu. You should see a black area being projected. To check whether the projector is working, move a window from the machine desktop to the right, so half of it bleeds to the second monitor. You should see the half window projected by the projector (probably distorted).
2. Go to the menu of the projector, set keystone to 0, all projector pictures settings to 0, and projection mode to "Rear".
3. Using the remote control, click the “gamma” button until you reach the option “gamma 2” (displayed on the screen).

**Setting communications:**
1. Right-click on the computer's icon on the desktop, and obtain the "Device Manager". From the list of devices, click on "Ports". For both COM1 and COM2 (or the ports you are using for communications with the projector), double-click on them, select the "Port Settings" tab, and set the following values:
   - Bits per second: 9600
   - Data bits: 8
   - Parity: none
   - Stop bits: 1
   - Flow control: none
2. Right-click on the computer's icon on the desktop, and obtain the "Device Manager". From the list of devices, click on "Ports". Double-click "Printer Port", select the “Port Settings” tab, and uncheck the option “enable legacy plug and play detection”.

**Installing control software:**
1. Install the SEI software (from the manufacturer’s disk).
2. Install the Dongle software (from the manufacturer’s disk).
3. From the “Start”, select “Programs”, then “Artistic License”, then “DMX Workshop 2”, and then run the program “WinNT Win 2k Driver Load”.
4. Install the projector software (from the manufacturer’s disk).
5. Reboot the machine.

**Calibrating the encoder:**
1. Install the "encoder server" from the zip file "encoder server.zip" into a directory "ed\encoder server".
2. With all the cables connected to the angle encoder, run the program "ed\encoder server\encoder server.exe".
3. You should see a message saying "InitializeSEI return=", a number, and then a message saying "running", followed by a number.
4. If that does not happen, check the cables of the SEI. Also check a window, created by the SEI Bus driver, and see if there is a green light there.
5. Keep the "encoder server" program running. To exit it, at the end of this process, just hit any key.
6. With the remote control of the projector, change the "focus" parameter. As you adjust focus, you should see numbers being printed on the screen. Go to the lowest end of the focus. Then move it all the way to the highest end.
7. If the sequence of printed number is not continuous, i.e., jumps from a high number to 1 in the middle of the focus movement, it's necessary to remove the jump. To do this, slide the rubber wheel that “reads” the focus position until there is no more jumps on the sequence of numbers.
1.4 Software Installation

Installing ed v1.1x:
1. Create directory C:\Program Files\Everywhere Displays
2. Unzip ed v1.1x.zip into this directory

Making the .edc files executable:
1. Right click C:\Program Files\Everywhere Displays\basic\basic.edc, then select "properties".
2. On the "General" tab, select "change".
3. On the "Open With" window, select "Others". Then browse until you find "ed.exe" in 'C:\Program Files\Everywhere Displays'. Select it, and click "Open".
4. On the "Open With" window, check the box "Always use this program to open these files", then "OK".
5. On the "properties" window, click "Apply", then "OK".
6. To set the ED icon for .edp and .edc files, do the following (not necessary, but neat):
7. Run "Folder Options", from the control panel (to get it, Click Start and select "Settings" and "Control Panel").
8. Select the "File Types" tab, and click "new".
9. On the "Create New Extension" window, type "edp", then "OK".
10. Now that the extension has been created, select the extension, and click "Advanced".
11. Click "Change Icon", and type 'C:\Program Files\Everywhere Displays\edp.ico', then "OK".
12. Close all icons by clicking "OK".
13. Repeat the procedure for the extension "edc". If the file type already exists, just associate the icon to it.

Running the system:
1. Open the directory of the demo (for instance C:\Program Files\Everywhere Displays\basic\).
2. Double click the file *edc (basic.edc).
3. The ED control bar appears on bottom left of the screen. A window showing the Everywhere Displays logo appears on the right side of the screen.
4. Exit the program.

Adjust the system description file “basic.edc”
1. Open the file “C:\Program Files\Everywhere Displays\basic\basic.edc”, that contains the following text
   edml_server
   render_area 0
   #mirror 2
   #projector 2 1 2
   surface_list <basic.edp>
2. Change the render_area value from 0 (top right of computer screen) to 1 (full 2\textsuperscript{nd} desktop screen).
3. Run the system. The Everywhere Display logo must be projected. Exit the system.
4. Change the mirror line to enable control of the mirror:
   Remove the sharp (#) sign, and change the mirror number to reflect the mirror type: (1) Elipscan or (2) Rosco.
5. Change the projector line to enable control of the projector:
   Remove the sharp (#) sign, and change the projector number to reflect the projector type: (1) Sanyo (2) Sharp. The second number corresponds to the number of the serial port connected to the projector, and the third numbers corresponds to the number of the serial port connected to the SEI adapter.
6. Run the system. The mirror and the projector should be activated.
   It may take several seconds for the projector to calibrate itself, and for the ED control bar to appear.

1.5 Creating Demo Scenarios and Configurations

To create a new demo/scenario:
1. Create a new directory.
2. Copy the files basic.edc and basic.edp from 'C:\Program Files\Everywhere Displays' to the demo directory.
3. Rename the files as appropriated.
4. Open "basic.edc" in Notepad, and substitute "basic.edp" by the name you have chosen for the edp file; save the file and close Notepad.
5. Run the demo by double clicking the "edc" file.
2 Vision System Part List

2.1 Part List

Computer 2 (for vision-based interaction):
- 900MHz or better, 500 Mbytes or more of RAM
- 1 serial port (to control camera)
- Osprey video board, (US$ 200.00)
- Windows 2000

Camera equipment
- Sony EVI-D30 pan/tilt video camera, (US$ 1200.00)
- Bogen magic arm to support camera, composed of 2929QR Variable friction Magic Arm with 3299 Quick Release Adapter and 2915 Super Clamp without Stud (US$ 150.00)

Cables/connectors to connect camera to computer (from radioshack, egghead, etc.)
- straight serial cable, DB9 female/DB9 female connectors (long enough to connect projector to computer 2)
- S-Video cable (long enough to connect projector to computer 2)