MirrorOp (for Mac) Application Operation Guide

This manual is an Operation guide for the MirrorOp (for Mac) application that can be used to perform network projection with a CASIO projector. Carefully read the information below before using this application.

For information about the software versions, computer operating environment, and supported projector models for this application, visit the CASIO website. https://support.casio.com/en/support/download.php?cid=007&pid=823

Keep this manual in a safe place for future reference.

Contents

1. Getting Ready

The contents of this section are intended mainly for network administrators. They include information about preparing an environment that enables network projection by a CASIO projector.

Some of the explanations in this operation guide make references to the manual below. These two manuals should be read together.

- The Network Function Guide of your projector.
  (If you are using an XJ-UT311WN or XJ-UT351WN projector, refer to the XJ-UT310WN Network Function Guide.)

1.1. Installing MirrorOp

You must install MirrorOp in order to use it. To output computer audio to the projector, you also need to install one of the audio drivers below.

Intel® CPU: SoundFlower

Apple M1 CPU: BlackHole

You can download the installer for these drivers from the CASIO website.

https://support.casio.com/en/support/download.php?cid=007&pid=823

1.2. Establishing a Network Connection Between the Projector and a Computer

To start network projection from a computer, there must be a network connection between the projector and a computer.

1.2.1. Establishing a Direct Wireless LAN Connection between the Projector and a Computer

With this configuration, the projector is used as a wireless LAN access point. A computer connects directly to the projector via a wireless LAN network connection.
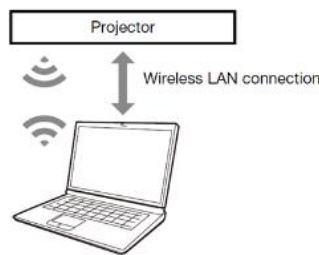
There are two different projector SSID types, each of which is described below.

SSID Type	Description	Applicable SSID
Generic SSID	This type of SSID prompts for input of a passphrase to connect. This type of SSID is preset on the projector, so the name and setting details cannot be modified.	casiolpj0101 casiolpj0102 casiolpj0103 casiolpj0104
User SSID	Requires creation of an SSID by you. Creation of only a single user SSID is supported. You can also specify the encryption type and passphrase input for connection.	casiolpj0<any character string>

1.2.1.1.   To use the projector generic SSID to establish a wireless LAN connection

1.   Select the projector's SSID.

Perform steps 1 through 5 under "To use a projector generic SSID to establish a wireless LAN connection and project" in the Network Function Guide. This selects the projector's SSID.

2.   On the projector's LAN Connection Standby Screen (page 6), note the projector SSID.

Confirm that the selected generic SSID name is displayed.

3.   On the computer, connect to the projector SSID via wireless LAN.

The table below shows the encryption type and SSID-specific passphrases for wireless LAN connection.

SSID of Projector Being Connected	Encryption Type	Passphrase
casiolpj0101		casiolpj01
casiolpj0102	WPA2-PSK-AES	casiolpj02
casiolpj0103		casiolpj03
casiolpj0104		casiolpj04

1.2.1.2.   To use the user SSID to establish a wireless LAN connection

1.   Perform steps 1 through 3 of the procedure under "To establish a wireless LAN connection using a projector's generic SSID" of this manual. This establishes a wireless LAN connection between the projector and computer.

2.   Access the projector's admin screen (page 6).

3.   Perform steps 3 through 9 under "To create a user SSID" in the Network Function Guide. This creates a user SSID.

4.   Perform steps 1 through 5 under "To use a user SSID to establish a wireless LAN connection and project" in the Network Function Guide. This selects a projector SSID.

5.   On the projector's LAN Connection Standby Screen (page 6), note the projector SSID.

Confirm that the selected SSID name is displayed.

6.   On the computer, connect to the SSID of the projector via wireless LAN.

Establish a wireless LAN connection using the encryption type and passphrase of the user SSID.

1.2.2. Connecting the Projector and Computer Via a Wireless LAN Access Point

Use the procedures in this section to connect the projector and a computer to an already operating wireless LAN access point.
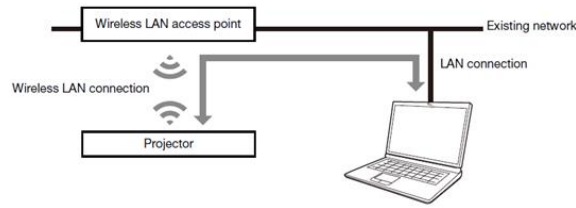
1. Perform steps 1 through 3 of the procedure under "To establish a wireless LAN connection using a projector's generic SSID" of this manual. This establishes a wireless LAN connection between the projector and computer.
2. Access the projector's admin screen (page 6).
3. Perform steps 3 through 9 under "To connect the projector to a wireless LAN access point" in the Network Function Guide. This connects the projector to a wireless LAN access point.
4. Connect the computer to the wireless LAN access point.

1.2.3. Connecting the Projector and a Computer Via a Wired LAN (excluding XJ-A Series)

1.2.3.1. Wired LAN Connection when the Computer is Not Connected to an Outside Network

Use a LAN cable to connect the projector and computer, and configure IP address settings for both.
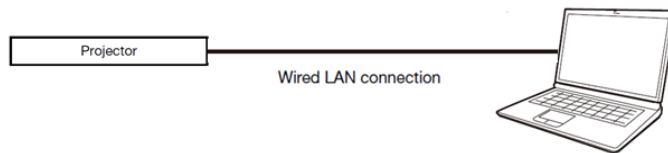
1. Perform steps 1 through 5 under "To use a LAN cable to connect a computer directly to the projector" in the Network Function Guide.

1.2.3.2. Wired LAN Connection when the Computer is Also Connected to an Outside Network

Use LAN cables to connect the projector and computer to the same router. In this configuration, the computer can use the network (internet or intranet) service connected to by the router. The network environment that can be connected to from the computer depends on the router.
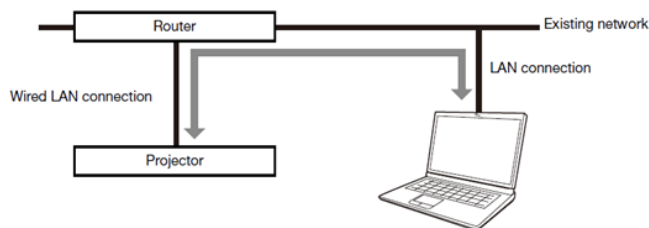
1. Perform steps 1 and 2 under "To establish a wired LAN connection between the projector and a computer via a router" in the Network Function Guide.

1.2.4.   Displaying the Projector's LAN Connection Standby Screen

Pressing the projector's [INPUT] key will display an Input dialog. Use the [▲] and [▼] keys to select "Wireless" (for an XJ-A Series projector) or "Network" (for an XJ-M, XJ-UT or XJ-F Series projector) and then press the [ENTER] key.

1.2.5.   Accessing the Projector's Admin Screen

You can use the web browser of a computer to access the projector's admin screen in order to configure projector network settings and to perform various other operations.
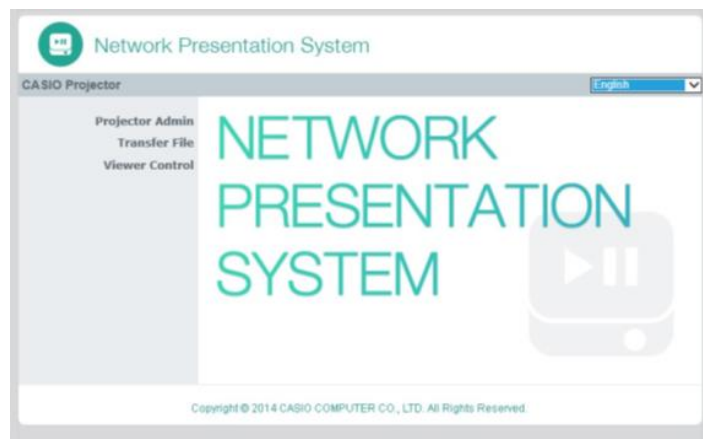
You can use either of the operations below to access the admin screen.

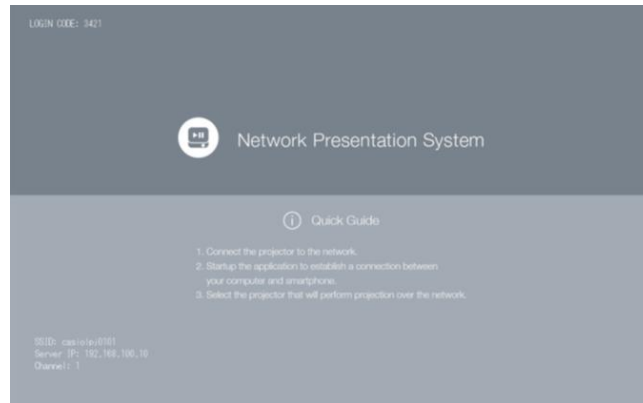| For this type of connection:	Perform this operation:
Computer and projector connected to a network	1．On the projector's LAN Connection Standby Screen, note the projector's IP address. 2．On the computer, start up a browser, input the projector's IP address into the address bar. Next, click the [Enter] key.
Computer and projector connected with MirrorOP	On the MirrorOP list panel, move the mouse pointer to the projector name that is marked with a blue checkmark (✓), which indicates the currently connected projector. Next click the ☰ mark to the right of the projector name.

2. Using MirrorOp

You can use MirrorOp to perform network projection of a computer screen image. To perform the operations in this section, you must first perform the operations below.

- Install MirrorOp on the computer (page 3).
- Establish a network connection between the computer and projector (page 3).

2.1. Starting Up MirrorOp

Start up MirrorOp.

2.2. Selecting a Projector and Projecting an Image

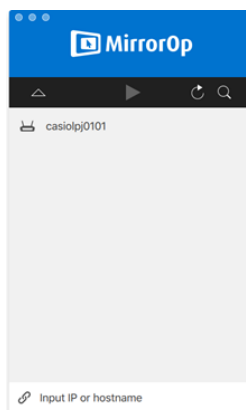You can select a projector for projection from a list that appears in the MirrorOP window.

2.2.1. To select a projector from the list and project an image

1. On the projector, display the LAN Connection Standby Screen (page6).
2. On the computer, start up MirrorOp.

   Following startup, the MirrorOp window shown below will be displayed.

The list shows both projectors that have been added to Favorites, along with automatically found projectors.

- MirrorOp will search for projectors on the network and display a list panel that shows all of the projectors it finds. An auto search operation covers only the projectors on the same network subnet as the computer.

- To add projectors to Favorites, either register them or use the procedure under "To import and export Favorites data" (page 9) to import Favorites data provided by your network administrator.

3. Move the mouse pointer to the line where the name of the projector you want to connect with is located, and then click the [Connect] button.

- If the "Passcode" dialog box appears at this time, input the 4-digit login code shown on the projector's LAN Connection Standby Screen.

- After connection between MirrorOp and the projector is established, a check mark (✔) will appear to the left of the connected projector's name in the projector list. The name of the connected projector will also be shown at the top of the MirrorOp window.

- After some time, the MirrorOp window style (page 11) will change from the list panel to the info panel. If you do not perform any operation after that, the window will switch to the mini panel.

Note: If the "Screen Recording" dialog box shown below appears when connecting, click [Open System Preferences] and allow screen recording.

After the System Preferences appear, select the MirrorOp icon checkbox for "Screen Recording" on the "Privacy" tab of the "Security & Privacy".

4. To start computer screen projection, click ▶.
    This projects the computer screen image from the projector.

Note: If there are multiple projectors in the list and you want to switch to another projector, first terminate projection by the current projector and then connect with the other projector.

2.2.1.1. Adding and Removing Projector Favorites

MirrorOp includes a function that lets you add multiple projectors on a network to a Favorites. Favorites can be exported to a file, which can then be distributed among other users on the same network. This helps to simplify network projection to specific projectors.

To add a projector to Favorites

1. On the computer, start up MirrorOp.
2. Move the mouse pointer to the line where the name of the projector you want to add to Favorites is located and then click the star (☆) on the right.
   - This will cause the star to change to ★ , which indicates that the projector was added to Favorites.

To remove a projector from Favorites

1. On the computer, start up MirrorOp.
2. Move the mouse pointer to the line where the name of the projector you want to remove from Favorites is located and then click the star (★) on the right.
   - This will cause the star to change to ☆ , which indicates that the projector was removed from Favorites.

2.2.1.2. To import and export Favorites data

To export Favorites data

1. Perform steps 1 and 2 under "To configure MirrorOp settings" (page 16).
2. Display the Favorites tab and then click the [Export] button.
3. On the save file dialog box that appears, specify the file name and storage location. Next, click the [Save] button.
   - The file name extension of the saved file is .xml.

To import Favorites data

Important!
- Performing the procedure below will replace the current Favorites with the imported data.

1. Perform steps 1 and 2 under "To configure MirrorOp settings" (page 16).
2. Display the Favorites tab and then click the [Import] button.
3. On the select file dialog box that appears, select the file you want to import.
   - Select a file that contains Favorites data you previously exported from MirrorOp.
4. Click the [Open] button.

2.2.2. Manually Searching for a Projector and Projecting from It

If the projector you want is not found by auto search when you start up MirrorOp, you can perform a manual search based on an IP address. With manual search, you can also connect to projectors that are outside of the subnet where the computer is located.

1. On the projector, display the LAN Connection Standby Screen (page 6).

2. On the computer, start up MirrorOp.

3. At the bottom of the window, click "Input IP or host name".

4. Input the IP address you want to use for the search.

5. Input the IP address shown on the LAN Connection Standby Screen of the projector to which you want to connect. (Searching according to IP address only is supported.)

6. Click [Connect].

   - The remainder of this procedure is the same as that following clicking of [Connect] in step 3 of the procedure under "To select a projector from the list and project an image" (page 7).

   - A projector that is found using this operation can be added to Favorites for future selection without needing to search for it. For details, see "Adding and Removing Projector Favorites" (page 9).

2.2.3. Stopping Projection

To stop projection, terminate the connection between MirrorOp and the projector.

1. On the MirrorOp window, click ▽ to display the list panel (page 11).

2. Move the mouse pointer to the line where the name of the connected projector located and then click ⊖. This terminates the connection with the projector and stops projection.

2.2.4. Projecting an Extended Desktop Screen

A display emulator is required to project an extended desktop screen.

For information about display emulators, visit the CASIO website.

https://support.casio.com/en/support/information.php?cid=007&pid=681

Use the procedure below to project an extended screen.

- If MirrorOp is running, shut it down.

1. Connect the display emulator to your computer.

2. On your computer, open System Preferences.

3. On the System Preferences screen, click "Displays".

4. On the Arrangement tab, select (✔) the "Mirror Displays" checkbox.

5. Start up MirrorOp.

6. Use the procedure under "Selecting a Projector and Projecting an Image" (page 7) to connect with the projector. This will project a screen capture.

7. Clear the "Mirror Displays" checkbox that you selected in step 4 of this procedure. This will start extended screen projection.

2.3. MirrorOp Details

This section explains operations that are supported by each MirrorOp window style, along with detailed information about MirrorOp operations.

2.3.1. MirrorOp Windows and Buttons

The different MirrorOp window styles are shown below.

| List panel (full) | List panel (mini) | Info panel | Mini panel |
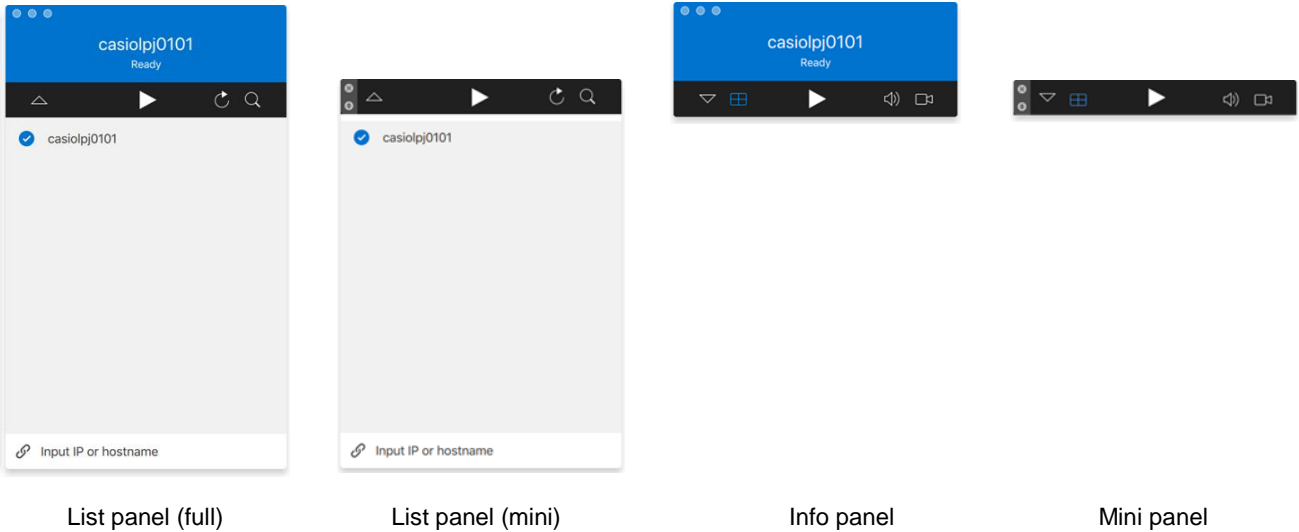
Normal startup of MirrorOp displays the list panel (full). If there is no cursor movement within the MirrorOp window after connecting a projector with it, the MirrorOp window will change automatically to the info panel and then the mini panel in order to reduce the space taken up by the window.

2.3.1.1. List Panel

The list panel can be used to perform operations related to selecting the connected projector. The function of each button is explained in the table below.

● List panel (full)

Clicking this button:	Does this:
	Switches to the mini panel. This button appears while a projector is connected with the computer using MirrorOp.
△	Switches to the info panel.

● List panel (mini)

Clicking this button:	Does this:
	Switches to the list panel (full).
△	Switches to the mini panel.

● List Panel Common Buttons

Clicking this button:	Does this:
↻	Re-executes the projector search operation.
🔍	Allows searching for a projector name in the displayed projector list.
▶	Starts computer screen projection.
■	This button is disabled.
❚❚	Pauses computer screen image projection, which freezes the currently displayed image.
✕	Exits MirrorOp.

2.3.1.2. Info Panel and Mini Panel

The info panel and mini panel are reduced-size versions of the MirrorOp window.

You can use the info panel and mini panel buttons to perform the operations below.
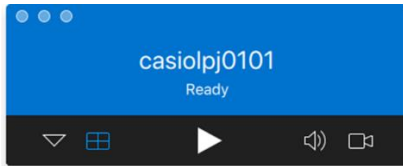
Info panel   Mini panel

● Info panel

Clicking this button:	Does this:
⊗	Switches to the mini panel.
▽	Switches to the list panel (full).

● Mini panel

Clicking this button:	Does this:
◓	Switches to the info panel.
▽	Switches to the list panel (mini).

● Info Panel and Mini Panel Common Buttons

Clicking this button:	Does this:
⊞	This button is disabled.
▶	Starts computer screen projection.
■	This button is disabled.
❚❚	Pauses computer screen image projection, which freezes the currently displayed image.
🔊	Toggles computer audio output to the projector between mute (🔇) and unmute (🔊).
🎥	This button is disabled.
✕	Exits MirrorOp.

2.3.2. Menu bar

You can use the menu bar to perform the operations described below.

Menu	This menu item:	Does this:
MirrorOp	About MirrorOp	Displays MirrorOp version information.
	Preferences...	Displays the Preferences dialog box. For details, see "MirrorOp Settings" (page 14).
	Quit MirrorOp	Exits MirrorOp.
File	Close	This menu is not available.
View	Discover List	This menu is not available.
	Favorites List	This menu is not available.
Controls	Disconnect	Terminates the connection between MirrorOp and the projector.
	Play/Pause	Starts computer screen projection. If projection is already in progress, this menu item toggles between project and pause.
	Stop	This menu is not available.
	Split Screen	This menu is not available.
	Mute	Same operation as the 🔊 button. See "Info Panel and Mini Panel Common Buttons" (page 12).
Window	Minimize	Minimizes the MirrorOp window.
	Mini Panel	Switches to the mini panel.
	Always on Top	Specifies whether or not the MirrorOp window should always be kept on top of other windows. The MirrorOp window is always kept on top of other windows when there is a check mark (✓) next to this item.* * Even if this setting is enabled, the MirrorOp window may not be displayed on top while the full-screen view of another application's window is displayed.
Help	Help	This menu is not available.
	Activate...	This menu is not available.
	Check For Updates	This menu is not available.

2.3.3. MirrorOp Settings

You can configure MirrorOp settings and tailor its operation to suit your needs.

2.3.3.1. MirrorOp Setting Items

● General Tab

Use this item:	To do this:
PresentSence	This setting is not available.
Name	Allows input of the computer's user name for display in the projector's projection image. Allowable number of input characters: 20 maximum Initial Default: Computer login user name
Allow controlling from tablets	Specifies whether or not remote control of the computer from smart devices is allowed. For details about remote operations, see "PC Remote" (page 17). ☑: Remote operation enabled. ☐: Remote operation disabled (initial default). Input any four digits. The passcode you input here must be input on a smart device that will be used for remote control of the computer.
Allow screen projection to be redirected to browsers	This setting is not available.
Allow control inputs from receivers	Specifies whether or not remote control of the computer is allowed. For details about remote operations, see "PC Remote" (page 17). ☑: Remote operation enabled (initial default). ☐: Remote operation disabled.
Allow the virtual screen frame to be shown during projection	Specifies whether a frame should be displayed around the projected image. ☑: Frame displayed. ☐: Frame not displayed (initial default).
Always On Top	Specifies whether or not the MirrorOp window should always be kept on top of other windows. ☑: Always keeps MirrorOp window on top.* ☐: Allow MirrorOp window to be hidden in the back when another application is active (initial default). * Even if this setting is enabled, the MirrorOp window may not be displayed on top while the full-screen view of another application's window is displayed.
Automatically check for updates	This setting is not available. Clear the checkmark (✔).
Check For Updates (Button)	This button is disabled.

● Favorites Tab

Use this item:	To do this:
Favorite List	Used to export Favorites data to a file or import Favorites data from a file. For details, see "To import and export Favorites data" (page 9).
Browse (Button)	Used to specify the temporary storage location of Favorites.
Restore Defaults (Button)	Used to return the temporary storage location of Favorites to its initial default setting.

● Advanced Tab

Use this item:	To do this:
Mode	This setting is not available.
Aspect Ratio (Button)	This setting is not available.
Restore Defaults (Button)	This setting is not available.

● Hotkey Tab

Use this item:	To do this:
Enable	This setting is not available. Clear the checkmark (✔).
Play/Pause	This setting is not available.
Stop	This setting is not available.
Display on Full Screen	This setting is not available.
Display on Top-Left	This setting is not available.
Display on Top-Right	This setting is not available.
Display on Bottom-Left	This setting is not available.
Display on Bottom-Right	This setting is not available.
Toggle Extended Screen	This setting is not available.
Mute/Unmute	This setting is not available.
Toggle Full Screen/Auto Layout	This setting is not available.
Restore Defaults (Button)	This setting is not available.

● About Tab

This tab shows the MirrorOp version number.

Use this item:	To do this:
EULA (Button)	This button is disabled.
Get Help (Button)	This button is disabled.

2.3.3.2. Configuring Settings

Settings can be configured even if there is no network connection between the computer and projector.

To configure MirrorOp settings

1. On the computer, start up MirrorOp.

2. On the menu bar, click "MirrorOp" and then click "Preferences..." to display the setup dialog box.

3. Use the Setup dialog box tabs to configure settings.

   ● For information about the setting items on each tab, see "MirrorOp Setting Items"(page 14).

4. To apply all of the setting changes you have made on all tabs, click the close (x) button in the upper right corner of the Setup dialog box.

2.4. Remotely Controlling a Computer from a Smart Device (PC Remote)

The procedures in this section explain how to use a smart device to remotely control a computer that is connected to the projector with MirrorOp.

Important!
- A smart device needs to have MirrorOp Receiver installed on it in order to perform remote operations. Download the MirrorOp Receiver app from the app store of your device: Google Play store for an Android device, App Store for an iOS device.
- When using PC Remote, it is assumed the devices described in (a) through (c) below are on the same subnet (first octet through third octet are the same).
  - (a) Network projecting (source) computer
  - (b) Smart device remotely controlling the computer
  - (c) Network projecting (destination) projector

To start up PC Remote
1. Use MirrorOp to start network projection from your computer.
2. Perform the steps below to enable PC Remote.
   - Once you enable PC Remote, it remains enabled until you disable it. This means you don't need to perform this operation each time, as long as PC Remote is not disabled.
     - (1) On the menu bar, click "MirrorOp" and then click "Preferences..." to display the setup dialog box.
     - (2) Display the General tab and then select (✔) the "Allow controlling from tablets" checkbox.
       - This will display a dialog box prompting you to enter a passcode. Input any four digits. The passcode you input here must be input on a smart device that will be used for remote control of the computer.
     - (3) Select (✔) the "Allow control inputs from receivers" checkbox.
     - (4) Click the [✕] button to close the dialog box.
3. On the smart device, execute the steps below.
   - Once you enable PC Remote, it remains enabled until you disable it. This means you don't need to perform this operation each time, as long as PC Remote is not disabled.

   Android:
     - (1) Start up MirrorOp Receiver.
     - (2) In the upper right corner of the screen, tap [▮] and then tap "Settings".
     - (3) Select (✔) the "Search for senders on start" check box.
     - (4) Exit MirrorOp Receiver and then start it back up again.
     - (5) On the list that appears, tap the computer you want to control remotely.
     - (6) Input the passcode you set on the computer with MirrorOp to connect with the computer.

   iOS:
     - (1) If MirrorOp Receiver is running, exit it.
     - (2) Tap the iOS setup icon and then tap "Receiver" (MirrorOp Receiver).
     - (3) Enable "Search for senders on start".

(4)   Start up MirrorOp Receiver.

(5)   On the list that appears, tap the computer you want to control remotely.

(6)   Input the passcode you set on the computer with MirrorOp to connect with the computer.

To exit PC Remote

1.   On the smart device being used for remote control, exit MirrorOp Receiver.

- Execute one of the operations below to exit PC Remote.

  - Turn off the projector.

  - On the computer, exit MirrorOp.

3. Open Source Software Used in MirrorOp

MirrorOp contains software components licensed under various Open Source licenses. Please refer to the list below for further information:

Name	Version	From	Licensing Terms	Modified / Used
Boost	1_57_0	http://www.boost.org/	Boost Software License 1.0 http://www.boost.org/users/license.html	Used
Crypto++	5.6.3	https://www.cryptopp.com/	Boost Software License 1.0 https://www.cryptopp.com/License.txt	Used
OpenSSL	1.0.2	https://www.openssl.org/	https://www.openssl.org/source/license.html	Used
JsonCpp	1.6.5	https://github.com/open-source-parsers/jsoncpp	MIT License https://github.com/open-source-parsers/jsoncpp/blob/master/LICENSE	Used
base64	NA	https://github.com/ReneNyffenegger/cpp-base64	zlib	Used
SoX	0.1.1	https://sourceforge.net/projects/soxr/	LGPL v2	Used
MediaInfo		https://mediaarea.net/zh-TW/MediaInfo	MIT License	Used
libiconv		http://www.gnu.org/software/libiconv	LGPL	Used
LibIntl		http://gnuwin32.sourceforge.net/packages/libintl.htm	LGPL	Used
x264		http://www.videolan.org/developers/x264.html	GPL v2	Used
MinHook	1.1.0.0	https://github.com/TsudaKageyu/minhook	MinHook license (BSD License) https://github.com/TsudaKageyu/minhook/blob/master/LICENSE.txt	Used
libjpeg	8a	http://ijg.org/	BSD-style license	Used
Syphon-virtual-screen	1.3	https://andreacremaschi.github.io/Syphon-virtual-screen/	MIT License https://github.com/andreacremaschi/Syphon-virtual-screen/blob/develop/SyphonVirtualScreen/LICENSES.txt	Used
SoundFlower		https://github.com/mattingalls/Soundflower	MIT	Used

CASIO®