

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=2381>

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Contents

| | | |
|----------|--|----|
| 1. | Getting Ready | 3 |
| 1.1. | Installing MirrorOp | 3 |
| 1.2. | Establishing a Network Connection Between the Projector and a Computer | 3 |
| 2. | Using MirrorOp..... | 4 |
| 2.1. | Starting Up MirrorOp | 4 |
| 2.2. | Selecting a Projector and Projecting an Image..... | 4 |
| 2.2.1. | To select a projector from the list and project an image..... | 4 |
| 2.2.1.1. | Adding and Removing Projector Favorites..... | 6 |
| 2.2.1.2. | To import and export Favorites data | 6 |
| 2.2.2. | Manually Searching for a Projector and Projecting from It | 7 |
| 2.2.3. | Stopping Projection | 7 |
| 2.2.4. | Projecting an Extended Desktop Screen..... | 7 |
| 2.3. | MirrorOp Details | 8 |
| 2.3.1. | MirrorOp Windows and Buttons | 8 |
| 2.3.1.1. | List Panel | 8 |
| 2.3.1.2. | Info Panel and Mini Panel | 9 |
| 2.3.2. | Menu bar | 10 |
| 2.3.3. | MirrorOp Settings | 11 |
| 2.3.3.1. | MirrorOp Setting Items | 11 |
| 2.3.3.2. | Configuring Settings..... | 13 |
| 2.4. | Remotely Controlling a Computer from a Smart Device (PC Remote) | 14 |
| 3. | Open Source Software Used in MirrorOp..... | 16 |

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.

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=2381>

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.

For the connection method, refer to the following section of the “Network Function Guide” of the applicable projector : “Establishing a Network Connection Between a Computer and the Projector”, “Configuring Projector Network Settings”, and “Using a Computer to Configure Projector Network Settings”.

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.

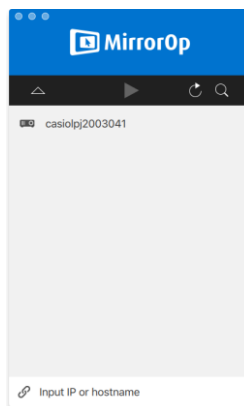
2.2. Selecting a Projector and Projecting an Image

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.
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 6) 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 8) 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 13).
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 13).
 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.
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 4).
 - 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 6).

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 8).
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.

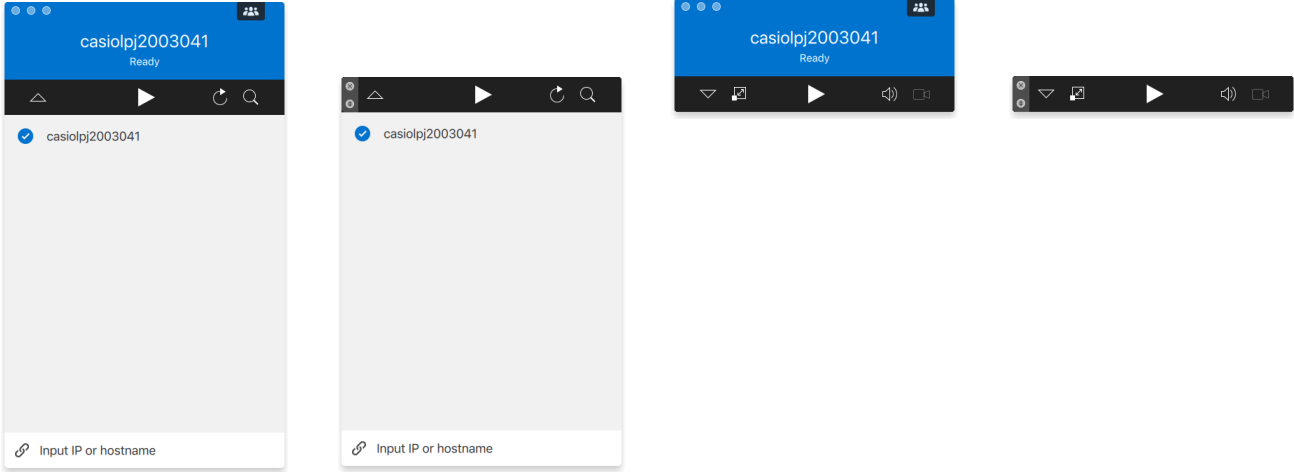
- If MirrorOp is running, shut it down.
1. Connect the display emulator to your computer.
 2. On your computer, open System Preferences.
 3. On the System Preferences screen, click "Displays".
 4. On the Arrangement tab, select (✓) the "Mirror Displays" checkbox.
 5. Start up MirrorOp.
 6. Use the procedure under "Selecting a Projector and Projecting an Image" (page 4) 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. |
| | This button is disabled. |
| | Switches to the info panel. |

- List panel (mini)

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

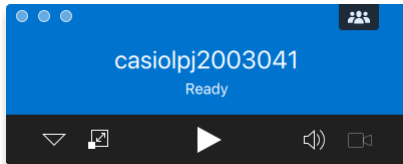
● List Panel Common Buttons

| 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. |
|  | Stop computer screen projection. |
|  | 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. |
|  | This button is disabled. |
|  | 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: |
|---|---|
|  | Toggle the projected image between auto layout and full-screen. |
|  | Starts computer screen projection. |
|  | Stop computer screen projection. |
|  | 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 11). |
| | 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 9). |
| 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 14). <input checked="" type="checkbox"/> : Remote operation enabled. <input type="checkbox"/> : 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 14). <input checked="" type="checkbox"/> : Remote operation enabled (initial default). <input type="checkbox"/> : Remote operation disabled. |
| Allow the virtual screen frame to be shown during projection | Specifies whether a frame should be displayed around the projected image. <input checked="" type="checkbox"/> : Frame displayed. <input type="checkbox"/> : Frame not displayed (initial default). |
| Always On Top | Specifies whether or not the MirrorOp window should always be kept on top of other windows. <input checked="" type="checkbox"/> : Always keeps MirrorOp window on top.* <input type="checkbox"/> : 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 6). |
| 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. |
| 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 11).
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 [x] 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 | Used |
| | | | http://www.boost.org/users/license.html | |
| Crypto++ | 5.6.3 | https://www.cryptopp.com/ | Boost Software License 1.0 | Used |
| | | | https://www.cryptopp.com/License.txt | |
| 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 | Used |
| | | | https://github.com/open-source-parsers/jsoncpp/blob/master/LICENSE | |
| 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) | Used |
| | | | https://github.com/TsudaKageyu/minhook/blob/master/LICENSE.txt | |
| libjpeg | 8a | http://ijg.org/ | BSD-style license | Used |
| Syphon-virtual-screen | 1.3 | https://andreacremaschi.github.io/Syphon-virtual-screen/ | MIT License | Used |
| | | | https://github.com/andreacremaschi/Syphon-virtual-screen/blob/develop/SyphonVirtualScreen/LICENSES.txt | |
| SoundFlower | | https://github.com/mattingalls/Soundflower | MIT | Used |

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