

## Main Macro Instructions

Cisco Boardroom Multi-Aux Version 1.0

For multi-camera solutions, up to four local cameras and 4 auxiliary codecs with 1 QuadCam each.

Table of Contents	
Main Concepts	General description
Sections 1-5 in the macro	Instructions for each part of the macro
Appendix A	How to setup camera presets with the API
Appendix B	How to setup multiple cameras on the Codec Pro

## Main Concepts

- Compositions object: config
- PTZ Microphone Zones – Z1 / Z2 / etc

**config** is the main object where you define the various “compositions” which determine what camera and video input combinations to show when a particular set of microphones are activated.

**PTZ Microphone Zones** are used only for PTZ Cameras, if you have any.

## Legal camera combinations

One to five Quad Cameras (or none at all). For each QuadCam beyond the one connected directly to the Codec Pro, an auxiliary codec (i.e. Codec Plus) is needed to accept that QuadCam and communicate with the main macro to be controlled by it.

One or more PTZ cameras

The total cannot exceed five cameras, because the Primary Codec has only six video inputs, and you must reserve at least one for content.

There must be at least two cameras that depend on microphones to activate them.

## Camera combinations that don't require this solution!

One Quad Camera by itself

One Quad Camera and one PresenterTrack camera

One SpeakerTrack 60 by itself

One SpeakerTrack 60 and one PresenterTrack camera

*Why are these listed as not requiring this solution?* Because you don't need any type of macros for these installations; which means you don't need this document or anything you downloaded along with it. *They are standard, out-of-the-box, TAC-supported installations.*

**The program in this solution provides automation** – when a person is speaking, the appropriate camera is automatically engaged. This is done by monitoring the microphone inputs on the Codec Pro to determine which input has a person that is actively speaking.

When a microphone is active, it will trigger a change in the Main Video Input on the Codec Pro. If you are using one or two Quad Cameras, it will select one of them, and the Quad Camera will automatically zoom in on the person speaking. If you are using one or two PTZ cameras (PTZ 4K or Precision 60), it will trigger a camera preset for one of the cameras.

If you are using two PTZ cameras, you can have a primary preset (using one camera) and a backup preset (using the other camera) so that remote participants never see one camera moving from one preset to another. Instead, the available PTZ camera will always be used, so the far end sees a clean cut.

+++++

+ Section 1 +

+++++

For any installation that has two or more Quad Cameras, the design mandates the use of a Primary Codec Pro and an Auxiliary Codecs that are capable of having QuadCams connected to them like the Codec Plus and Codec EQ. You can also use Room Bars as auxiliary codecs if the camera in those is sufficient for your needs.

*If your installation involves more than one codec, enter the following information into Section 1 of your copy of the main\_codec.js file that will be installed in the main codec:*

For **AUX\_CODEC\_USERNAME** and **AUX\_CODEC\_PASSWORD** enter a valid admin username and password for inter-codec communication.

- Whenever there are two codecs, they communicate with each other using HTTP messages.
- The admin must create identical admin-level accounts on all codecs, for use by the program
- An example is username: CameraMacro and password: CameraMacro
- It is recommended to use these accounts only for the macros to use; create separate admin account(s) for the installer and local administrators

If your installation uses only one codec (a CodecPro as the main codec), you can leave **AUX\_CODEC\_USERNAME** and **AUX\_CODEC\_PASSWORD** blank

Set **USE\_ST\_BG\_MODE** to true if you want keep QuadCams Speaker Tracking even while not being used

The config constant object contains general microphones and video sources and, alternatively, presetZones for both main and auxiliary codecs:

- '**monitorMics**' this is where you identify the physical microphone inputs on the Codec Pro that you want to monitor. Any microphone input that is used to automate a camera selection is listed here. You can list any microphone input numbers – just a few or all eight.

The physical microphone inputs on the Codec Pro are used to trigger camera actions automatically. If you use Cisco Table Microphones, you can have up to eight connected to the Codec Pro. If you use an audio DSP, you can have up to eight analog inputs from the DSP into the Codec Pro. Each analog line from the DSP would represent the microphones that define the up-to-eight Microphone Zones that you need.

The value for the 'compositions' key is an array of composition objects with values corresponding to the following keys:

- '**name**' The name of the composition. This is just used as an internal reference in the macro and is printing in the console logs.
- '**codecIP**' is the IPv4 IP address of the Auxiliary codec that is the source that a particular composition will use. and the 'source' field is set to CODEC\_AUX. The 'connectors' array for this composition should contain the ID of the connector of the tie line coming from that auxiliary codec into the main codec.
- '**mics**' is the array of active microphones that are considered to switch to that particular composition
- '**connectors**' are the video connector IDs to use in conjunction with the 'layout' value to set the main video input when any microphone in the 'mics' array is the most active.
- '**source**' should be set to CODEC\_AUX if any of the video connectors in the 'connectors' array correspond to tie lines coming in from an Auxiliary codec. If not, it should be set to CODEC\_MAIN unless the composition corresponds to the Overview compositions where the 'mics' array is set to [0] in which case it should be set to CODEC\_NONE
- '**layout**' specified the Layout to use to arrange the input connectors specified in the 'connectors' array. This can be Prominent , Equal or PIP
- '**presetZone**' is an optional field that can be used instead of the 'connectors' array to specify a preset "zone" to use for that particular composition. Preset zones are explained in section 2 below. Please set the value to Z0 to indicate it is not used

- The '**auto\_top\_speakers**' constant contains the settings to configure the “Top N Speakers” feature which shows people that are speaking at the same time and are assigned to different cameras as per the microphones associated to them. To turn it on, set the '**enabled**' attribute to '**true**'. You then edit the '**default\_connectors**' array to provide an ordered list of the connectors to use when showing the top N speakers and also the layout to use in the '**layout**' attribute. The '**max\_speakers**' corresponds to the N value of the Top N speakers feature, so it allows you to limit the number of top speakers to show. This feature does not yet work with compositions that include PTZ Zones.

+++++

## + Section 2 +

+++++

If you have PTZ cameras, this is where you define the PTZ Microphone Zones for them.

**A simple example** – let's say you need one PTZ camera to point toward the head of the table, where the executives sit, because the Quad Camera does not zoom in enough. So – you would use one of your microphone Zones and the assignment for PTZ Zone 1 in Section 2 of the macro would look like this:

```
Z1.primary = 11; Z1.secondary = 12
```

**Why?** Because you are only defining one microphone zone, and you have only one PTZ camera. You can't have a different secondary preset if there is only one PTZ camera. Currently, the code is always also looking for the 'secondary' key so you must specify it even if it's corresponding value is the same as the 'primary'.

**What?** The number 11 represents the PresetID that you are using on the codec. **Don't use PresetIDs 1 thru 10**, because your users will need the ability to set camera presets from the Cisco Navigator / Touch 10 user interface. Therefore, we recommend that you start with PresetID: 11 and go up from there.

**A complex example** – you have two Quad Cameras (leaving you only six Microphone Zones) and you have two PTZ cameras. And – you want to set up six Microphone Zones with both a Primary and a Secondary Camera Preset.

The assignment for PTZ Zones Z1-Z6 in Section 2 of the macro would start like this:

```
Z1.primary = 11; Z1.secondary = 12
```

```
Z2.primary = 14; Z2.secondary = 13
```

```
Z3.primary = 15; Z3.secondary = 16
```

```
Z4.primary = 18; Z4.secondary = 17
```

```
Z5.primary = 19; Z5.secondary = 20
```

```
Z6.primary = 22; Z6.secondary = 21
```

**Why?** You have defined six different Microphone Zones, each with a primary and a backup camera preset. Remember: these zones are only used for PTZ cameras – they are not needed for Quad Cameras.

+++++

## + Section 3 +

+++++

**MAIN\_CODEC\_QUADCAM\_SOURCE\_ID** – Some functions of the macro rely on knowing if a QuadCam is configured on the main CodecPro. Please specify the SourceID where the QuadCam is connected or 0 if not is being used.

**MAP\_PTZ\_CAMERA\_VIDEO\_SOURCE\_ID** - In order for the program to work correctly, it is necessary to list the physical video input for each Camera ID# - but only for the PTZ cameras. For example, it is common to have one of the cameras plugged into 3G-SDI input 6, so as written CameraID: 2 is using physical input #6. The other two PTZ cameras have IDs of 3 and 4, using inputs 2 and 4 respectively. Any camera can use any input, except that the Quad Camera should use input 1 (because of ARC). You do NOT need to list the inputs used by the local Quad Camera, by the Aux Codecs, or by a Presenter Camera.

In RoomOS 11 there are multiple SpeakerTrack default behaviors to choose from on the navigator or Touch10 device. Set **ST\_DEFAULT\_BEHAVIOR** to the one you want this macro to use from these choices:

**Auto:** The same as BestOverview.

**BestOverview:** The default framing mode is Best overview.

**Closeup:** The default framing mode is Closeup (speaker tracking).

**Current:** The framing mode is kept unchanged when leaving a call.

**Frames:** The default framing mode is Frames.

**REMOVE\_EMPTY\_SEGMENTS** – When the macro is being used in a “Compass” room configuration where there are 4 QuadCams or RoomBars in a center island pointing in 4 different directions to cover tables that are arranged around the camera array, it is useful to remove empty segments of the table when showing an overview of the room so that the segments where there are people show bigger. To enable this functionality, set the REMOVE\_EMPTY\_SEGMENTS constant to true or false correspondingly.

+++++

+ Section 4 +

+++++

## Timers and Thresholds

**‘SIDE\_BY\_SIDE\_TIME’** allows you to change the amount of time before the OVERVIEW shot is used when nobody is speaking. The default is 10 seconds, but this can be changed.

**‘NEW\_SPEAKER\_TIME’** is the amount of time to wait before switching to another speaker. Two seconds works well.

**‘INITIAL\_CALL\_TIME’** is the amount of time that the OVERVIEW shot is used at the beginning of a call.

**‘VIDEO\_SOURCE\_SWITCH\_WAIT\_TIME’** is the amount of time that the codec will wait for the new camera to arrive at its preset before switching to it. It allows the camera to pan / tilt / zoom without being seen by remote participants. You should experiment with this value during commissioning.

‘**MICROPHONELOW**’ and ‘**MICROPHONEHIGH**’ are the minimum and maximum microphone level thresholds. The default values usually work well, but this should be experimented with during commissioning. The way it works is this:

- If a single microphone has an average value above the **MICROPHONEHIGH** threshold for two seconds, then action is taken to switch to the appropriate camera. If the camera is already there, no action is taken.
- If all of the microphones have an average value below the **MICROPHONELOW** threshold, then action is taken to switch to the **OVERVIEW** shot. If the camera is already there, then no action is taken.
- If the loudest microphone is between the **LOW** and **HIGH** thresholds, then there is not enough information, and no change happens from the previous time interval.

+++++

+ Section 5 +

+++++

## PresenterTrack Q&A Mode

**ALLOW\_PRESENTER\_QA\_MODE** – Set this constant to true to allow users to turn on the Q&A mode when using the custom panel to turn on/off PresenterTrack. When in Presenter Track mode with Q&A mode enabled, the macro will take care of keeping the focus on the presenter and if a question comes in from the audience it will compose the image of the presenter plus the audience member while they are talking and a few seconds afterwards (controlled by the **PRESENTER\_QA\_KEEP\_COMPOSITION\_TIME** configurable constant in the macro) it will focus back only on the presenter; this behavior is similar to the native "Classroom Mode" which is not compatible with this macro. If you select PresenterTrack without the Q&A mode option, the macro will make sure the presenter is always the one being shown in the call irrespective if anyone else in the room is speaking until you turn off PresenterTrack either via the custom panel or using the native camera controls of the codec.

NOTE: Even though the Q&A Mode for PresenterTrack should also work for compositions that include PTZ Zones, this has not been tested.

**PRESENTER\_QA\_AUDIENCE\_MIC\_IDS** – Specify in this array the microphone IDs of those microphones that are being used by audience members and should be the same that are used to trigger the switching of compositions depending on which part of the room is speaking. The idea is to leave out any microphones being used by the Presenter so that the macro can distinguish between the presenter speaking and someone in the audience asking a question.

**PRESENTER\_QA\_KEEP\_COMPOSITION\_TIME** -- is the time in microseconds that the macro will keep sending a composed image of the presenter and an audience member asking a question after the question has been asked by any audience member. If different audience members ask questions while the composition is being shown after **NEW\_SPEAKER\_TIME** milliseconds have passed, the composition will change to use that new audience member instead of the original. This will continue until no other audience members have spoken for **PRESENTER\_QA\_KEEP\_COMPOSITION\_TIME** milliseconds and then the code will resume sending only the full video feed from the Presenter camera

The rest of the macro should not be edited.

## APPENDICES

### APPENDIX A – How to set camera presets using the API

- Open an SSH session into the codec you are working on.
- Attach a Touch 10 or Navigator to the codec (in case there is not one already attached).
- Using the touch interface, select the desired camera and use the PTZ controls to get to the specific area you want to cover. Obviously, use full screen SelfView while you are doing this.
- To assist in lining up the camera settings between the Main and Aux codecs for this macro, you can issue this command on the Main code (Codec Pro) to be able to see both Camera 1 (QuadCam) on the CodecPro and the view coming from the Auxiliary codec into connector 2 side by side:
  - `xCommand Video Input SetMainVideoSource ConnectorId: 2 ConnectorId: 1 Layout: Equal`If you manually adjust the camera on the Main codec, it will revert to showing you Camera Input 1 full screen on your self-view or preview, just re-issue the above command on the command line to check again. Manually adjusting the camera on the Aux codec while in this manual side by side view will not reset the preview so you might want to do the fine adjustments on the Aux camera so line up with what you have for the main camera.
- Once you are satisfied with the camera view, use the API to store the preset - **do not use the Touch 10 or Navigator to store the preset.**
- Here is the API you need to use:
  - `xCommand Camera Preset Store`
  - `CameraId(r): <1..7>`
  - `Name: <S: 0, 255>`
  - `PresetId: <1..35>`
- The "Name" field is optional.
- **Example:** in order to set camera #1 with a preset number of 30, you would use this command:
  - `xCommand Camera Preset Store CameraId: 1 PresetId: 30`
- Repeat this process for each camera and every camera preset that you need to set.
- To make adjustments to a preset that you have already stored, again you would use the API. Let's use the same example:
  - `xCommand Camera Preset Activate PresetID: 30`
- Use the touch interface to correct the camera position, then store it again:
  - `xCommand Camera Preset Store CameraId: 1 PresetId: 30`

#### NOTES:

- Sometimes major RoomOS upgrades delete presets. So that you do not have to re-do the entire process described above, you might want to store away the Pan-Zoom-Tilt settings on the camera for each codec while the Preset30 is active by issuing this command on each and safely storing the values returned:
  - `xCommand Camera Preset Show PresetId: 30`You can later set the camera exactly to what the preset had stored before saving it again using this command:
  - `xCommand Camera PositionSet CameraId: value Pan: value Tilt: value Zoom: value`

More details on that command can be found here:  
<https://roomos.cisco.com/xapi/Command.Camera.PositionSet>

- Normally the Primary Codec has the highest number of camera presets.
- It is perfectly OK to use identical preset ID numbers on *different* codecs.
  - For example, we normally use PresetID 30 for all Overview shots. In the case that you use two codecs - one Pro and one Plus - you would set PresetID 30 on both of them for the Overview shot.
  - To summarize - you cannot use identical Preset numbers on a single codec; but when you have multiple codecs it is a good practice to use identical preset numbers for identical purposes (like the Overview shot).

## APPENDIX B – How to properly set up multiple cameras on a Codec Pro

- All of the cameras that are connected directly to the Primary Codec - the Quad Camera or SpeakerTrack 60 (if any) and the Precision 60 or PTZ 4K Cameras - **must** be controllable successfully from the Cisco user interface.
- The Quad Camera should **always** use HDMI input 1, and should **always** have CameraID 1.
- All of this requires that the cameras are correctly setup in the codec's web interface. Specifically, there are two areas of concern:
  - In the Video Input section, for each Connector that has a camera (Connectors 1-6 on the Codec Pro; Connectors 1-3 on the Codec Plus), the Input Source Type should be Camera, there should be a valid numeric CameraID, and Camera Control Mode should be On.
  - In the Settings / Camera section, enter the camera serial numbers into their corresponding CameraID sections.
  - Do not skip CameraID numbers! If you have five cameras, they must be numbered from 1 to 5.
  - If you are using SpeakerTrack 60, use CameraIDs 1 and 2 – because there are two P60 cameras.
- If all of this is done correctly, you will be able to control every camera from the Touch 10 / Navigator. Then you can proceed with setting camera preset ID numbers.
- If any Auxiliary codecs are used - such as a Codec Plus - the Quad Camera or SpeakerTrack 60 connected is also setup correctly as described above. It is not common to have any PTZ cameras on the Auxiliary codecs, but if they exist, they must also be set up correctly.

Document version 1.0  
April 10, 2023  
Gerardo Chaves