

L5 Connect/Version 9

ZoomID Tag Calibration Procedure

Version 2

Required Materials

1. ZoomID starter tag book L5TAG01J00A (or previously prepared reference tag)
2. USB keyboard and mouse
3. Badge for user with admin credentials for accessing target toolbox

Setup

1. ATC toolbox must be calibrated. Toolbox does NOT need drawer training to be completed. It is not necessary to re-calibrate the toolbox if that procedure has already been completed.
2. Select and prepare a reference tag to use for procedure*
 - a. Recommended tag is "1231461" (last page of starter book, fourth tag from bottom).
 - b. If recommended tag is not available, select an alternate that fulfills:
 - i. "Large" tag size
 - ii. Contains at least 1 of each distinct color tag stripe in use.
 - c. Remove a 2"-3" portion of the reference tag and affix it to a firm backing material.

*Note that "blue" tag color is not used in early tag books, so it is not included in the recommended reference tag. If system will make use of tags containing dark blue color stripes, select an appropriate reference tag containing all six colors.

Procedure

1. While not logged in to the toolbox, from the main screen press the gear icon to access the menu. Follow menu options: Menu/Troubleshooting/Calibration/Camera Chip Config
2. Scan the admin badge to access Camera Chip Config function.

Camera Chip Configuration

Shutter Width
0-300 (DEFAULT = 160)

Target Intensity
96-216 (DEFAULT = 160)

***DARK Target Intensity**
20-180 (DEFAULT = 0)

160

216

55

Initial image brightness at first drawer open.

Target brightness of the position dots.

*Sets target for non-dot exposure level (experimental)

Camera

Red Gain
8-31

Green Gain
8-31

Blue Gain
8-31

1		2		3		4	
31	(31)	31	(31)	31	(31)	31	(31)
20	(21)	20	(20)	20	(20)	20	(20)
25	(26)	25	(24)	25	(25)	25	(25)

Z71MR001 sw:9.7.6.0811 8/16/2023 19:14:33 (UTC)

Figure 1: Camera Chip Configuration screen

3. Set Camera RGB gains to recommended starting values for all cameras*:

Red = 31

Green = 20

Blue = 25

*If a “lock” icon button is shown in the lower right, this procedure may have already been performed. You can press the lock button and select the “unprotected” option to repeat gain adjustment if needed.

4. Press the camera icon button on the right side to launch the live camera view screen.

You can select drawer 2 or drawer 3 for this procedure at your convenience. You should use the same drawer for all cameras.

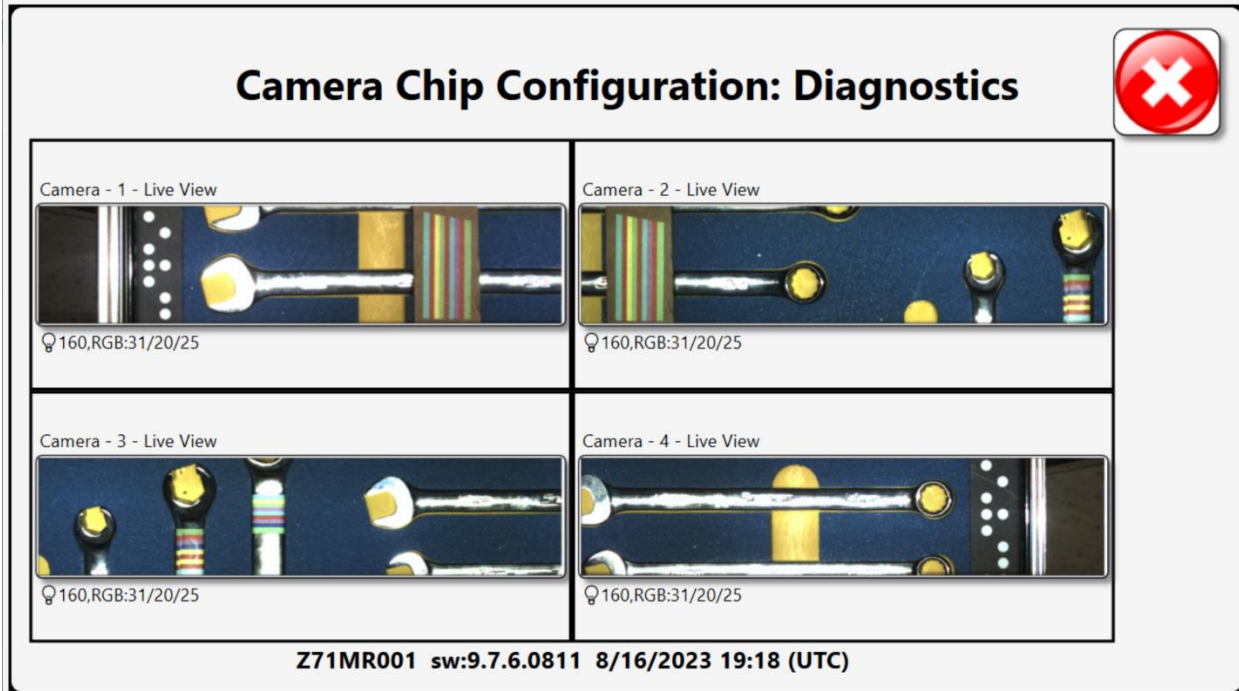


Figure 2: All cameras live view screen

5. Starting with camera 1 and moving up from there, for EACH camera:
 - a. Click the camera image view to switch to the individual camera view screen.

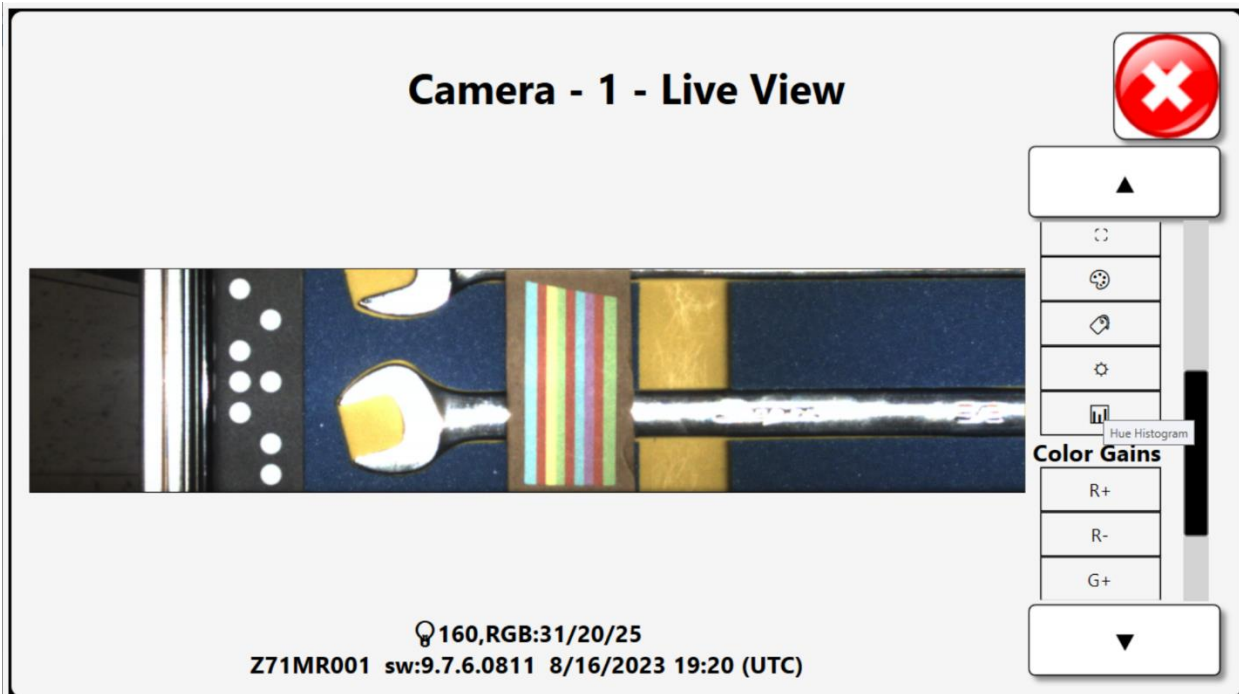


Figure 3: Single camera live view screen with reference tag

- b. Place the reference tag flat against the foam and adjust the drawer to roughly center the tag in the view of the target camera. The tag edges should be straight relative to the displayed drawer image.
- c. Scroll the menu button down and click the hue histogram  button on the right side.
- d. Using the mouse, inside the displayed image click and drag a rectangle from the upper left corner to the lower right corner of the tag and then release the mouse button. Try to get as much of the tag area within the rectangle as possible without going outside the tag.

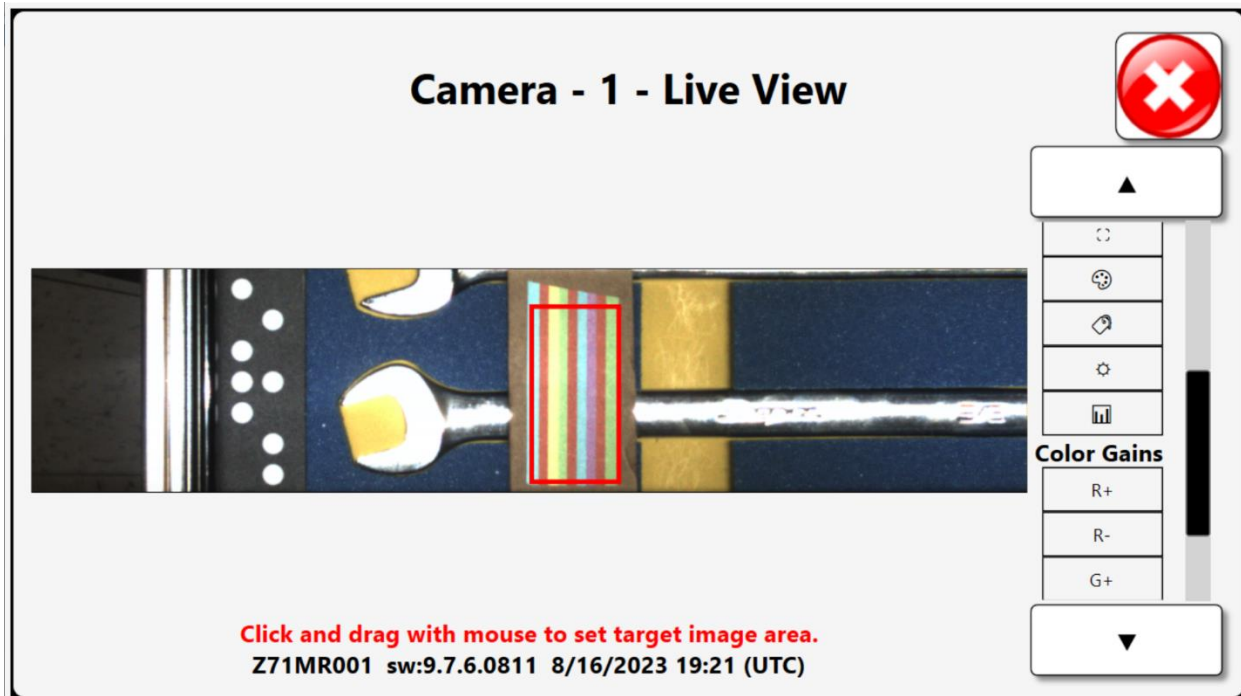


Figure 4: Click and drag mouse to select tag area after pressing hue histogram button

The live view will switch to a histogram display. Do not move the drawer or the test tag after selecting the area. (If necessary, you can click the hue histogram button again to return to the normal live view and repeat the area selection.)

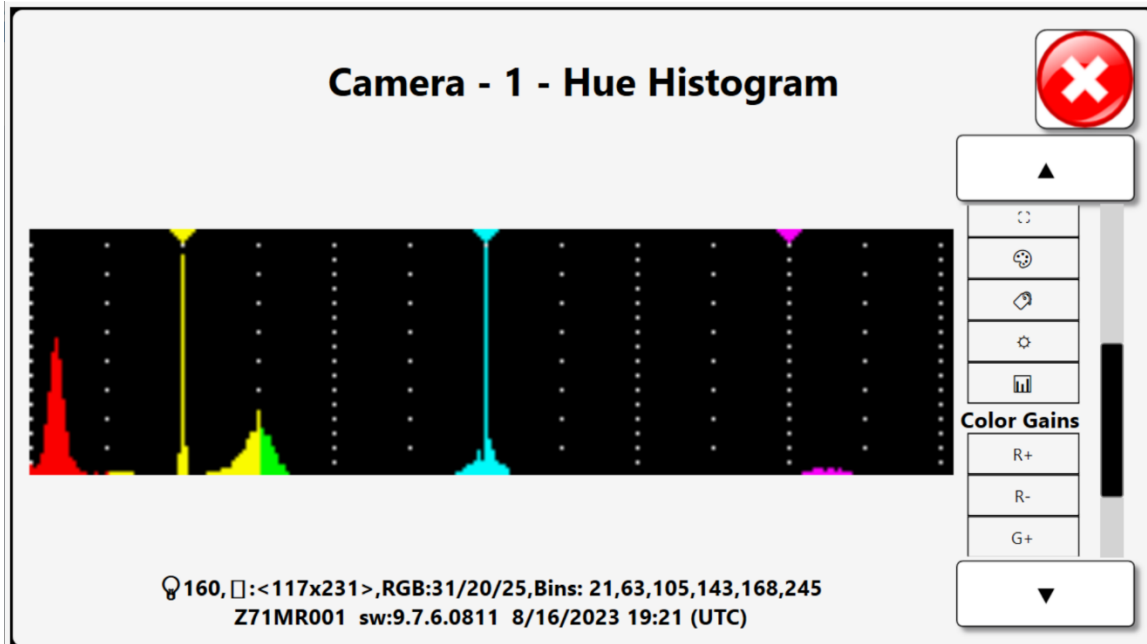


Figure 5: Hue histogram overexposed (note very tall skinny lines on yellow and cyan values)

- e. Your histogram will likely have extremely tall, narrow lines as shown above due to overexposure of the tag image. Using the Brightness up/down ▲/▼ buttons, adjust the image exposure down to eliminate this effect. Current exposure value is shown after the lightbulb 💡 symbol in the image details text. Common values for a good exposure are 80, 96, or 112, but your toolbox hardware may be higher or lower. Note the adjusted exposure number, you will use the same value again later in the process.

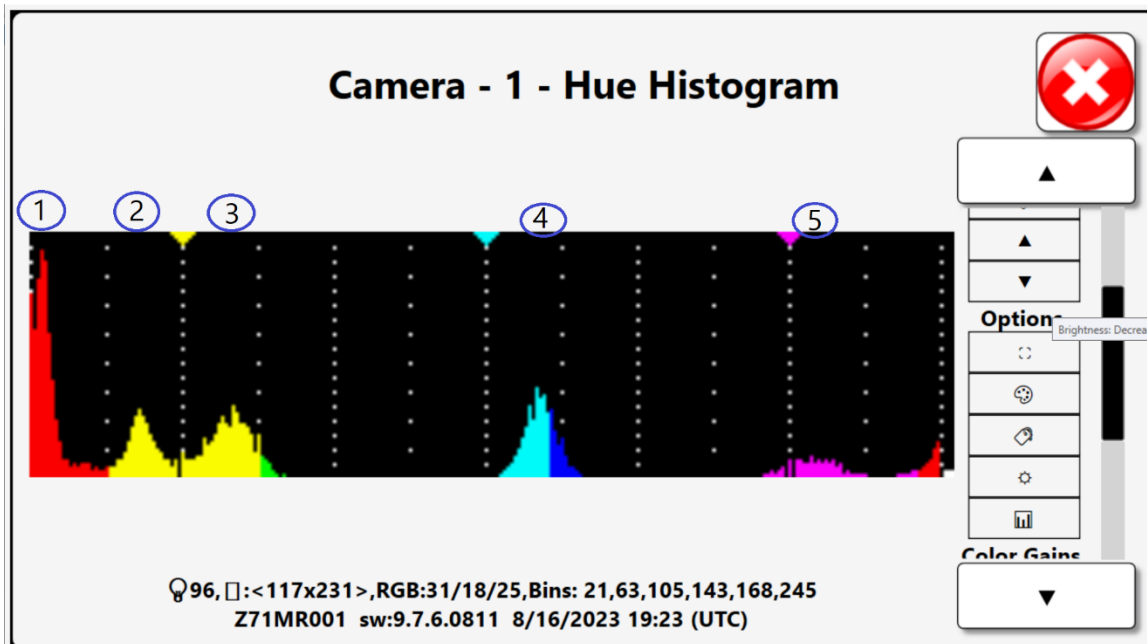


Figure 6: Exposure corrected, pre RGB gain adjust

The above image shows a typical starting point after fixing overexposure. The “peaks”, or local high points, of the histogram are labeled by number starting from the left inside the blue circles in the image. The next part of the process will place the peaks of each bump in the histogram at their appropriate location. The first step will use color adjustments to try and move the 2nd peak from the left to line up with the yellow triangle on screen.

Red gain should stay at the maximum value of 31. (You can see current settings after ‘RGB:’ in the details text below the image.)

- f. Use the G+/G- buttons to adjust 2nd peak from the left (yellow area) as close as possible to the yellow triangle target at the top of the graph. You may have multiple peaks displayed as yellow when starting, focus on the 2nd peak from the left.

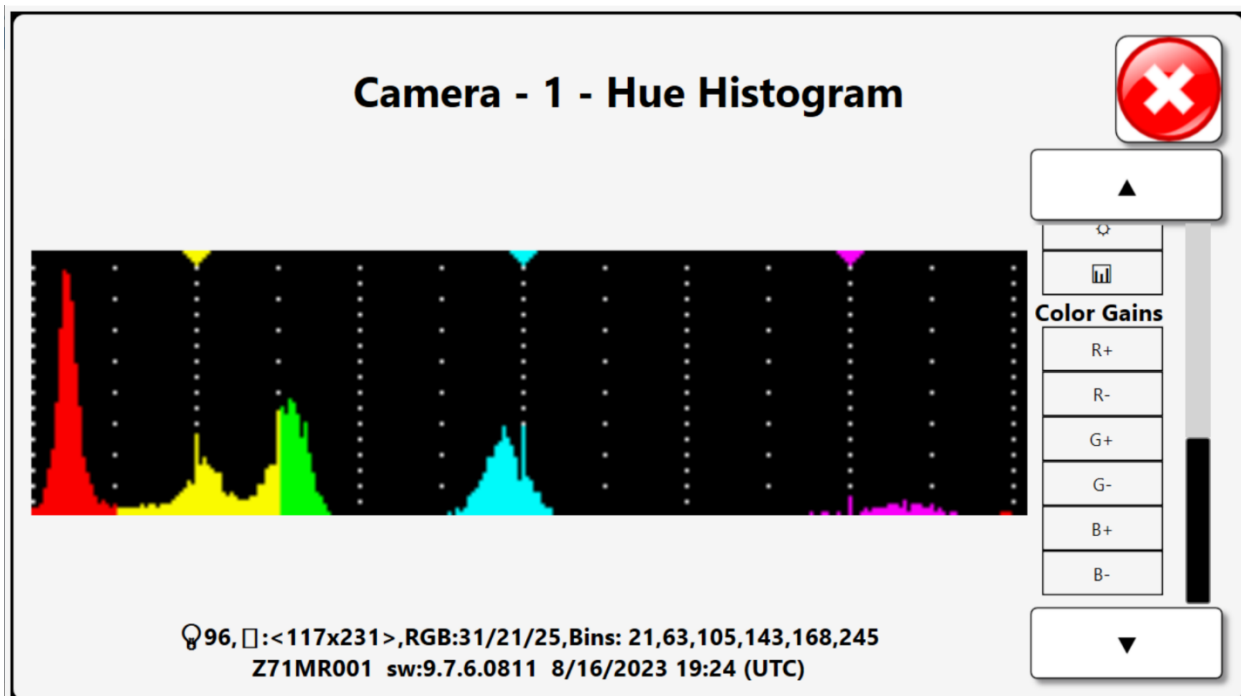


Figure 7: Post yellow peak adjustment, second peak lines up with yellow triangle target at top.

In the above image, you can see that the 2nd peak is just to the right of the yellow triangle target after increasing G gain from 18 to 21.

- g. After aligning the yellow peak, use the B+/B- buttons to move the cyan (peak 4) and magenta (peak 5) as close to their matching color triangles as possible. It is common for the magenta area to be very “flat”, try to align the center of the magenta section to the magenta triangle target.
- h. Changing the blue value may affect the yellow position. If necessary, repeat the adjustment process to get a “best fit” for all 3 color targets.

- i. After achieving the desired fit, press the Pause button (top of menu) to freeze the displayed image for future reference.

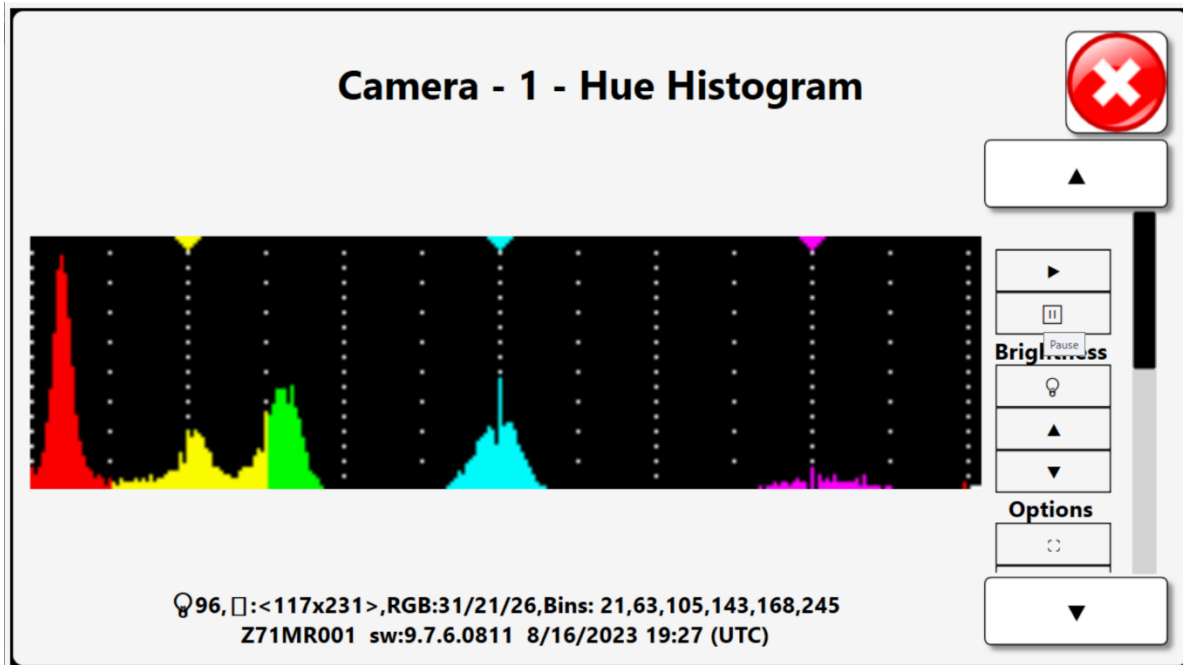


Figure 8: Yellow, cyan, & magenta peaks adjusted

- j. Press the close button (x) at the upper right to return to the all camera view screen.

As you repeat the adjustment process (Step 5 a-j) for the remaining cameras, try to line the peaks up between each camera. (If you can't get a certain color peak centered on the triangle, try to pick the same closest side left or right for all the cameras that don't line up in the center.)

6. After all cameras have been adjusted, confirm that the peaks roughly match between cameras.

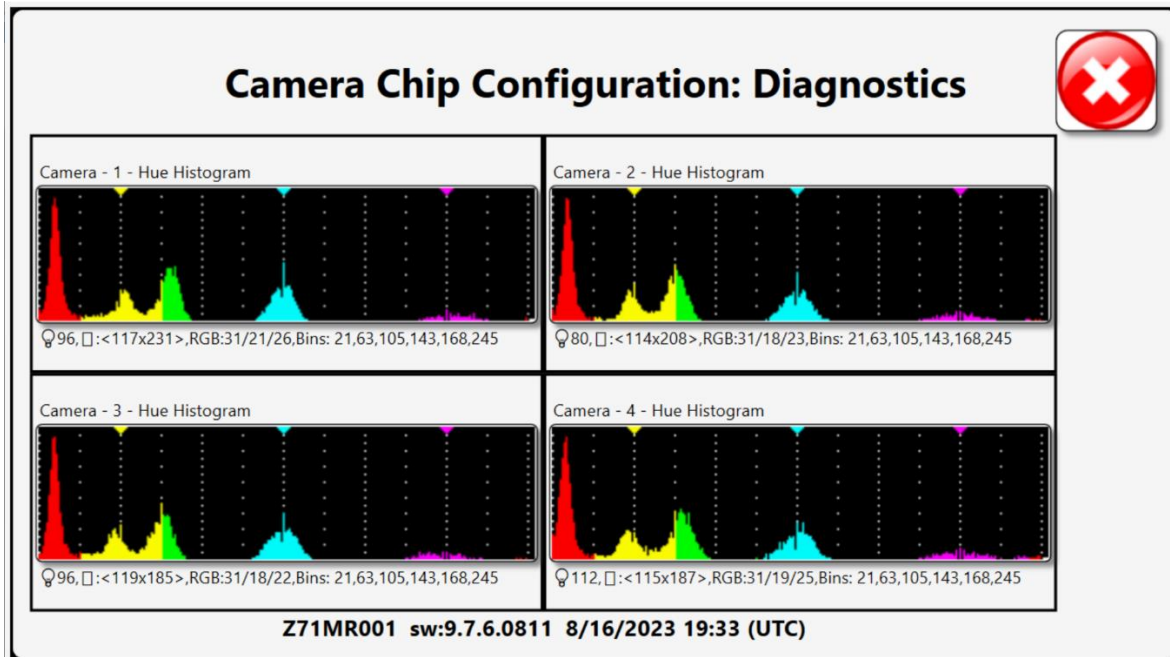
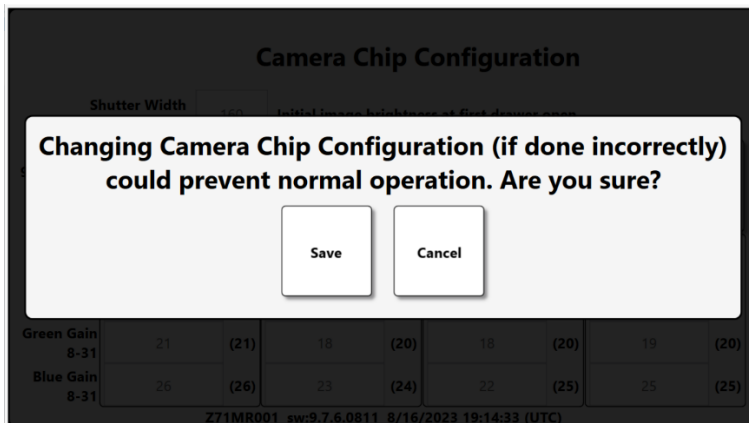
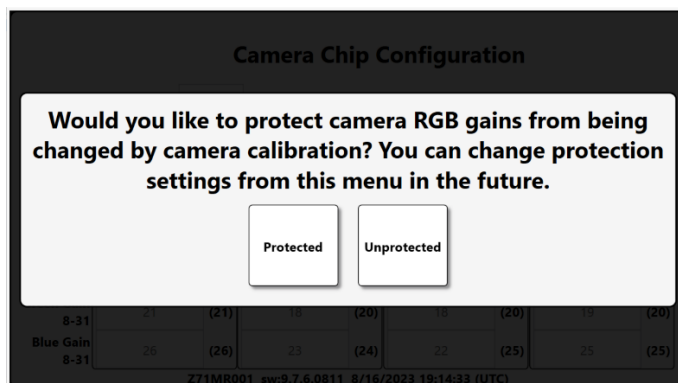


Figure 9: All cameras view, post RGB gain adjust

7. Close the all camera view.
8. Close the drawer when prompted.
9. Press the green check in the upper left corner to save your changes.
10. Select the 'Save' option at the are you sure prompt.



11. Select 'Protected' when prompted to protect RGB gains from being changed.



12. Wait for the hardware re-initialization process to start and complete.

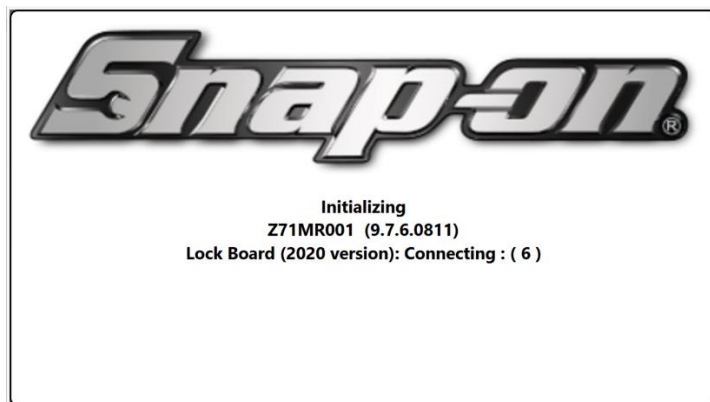


Figure 10: Hardware re-initialization screen

13. On the calibration menu, press the ColorID tag: settings button. (If you have closed the menu, you can access this at Menu\Troubleshooting\Calibration.)

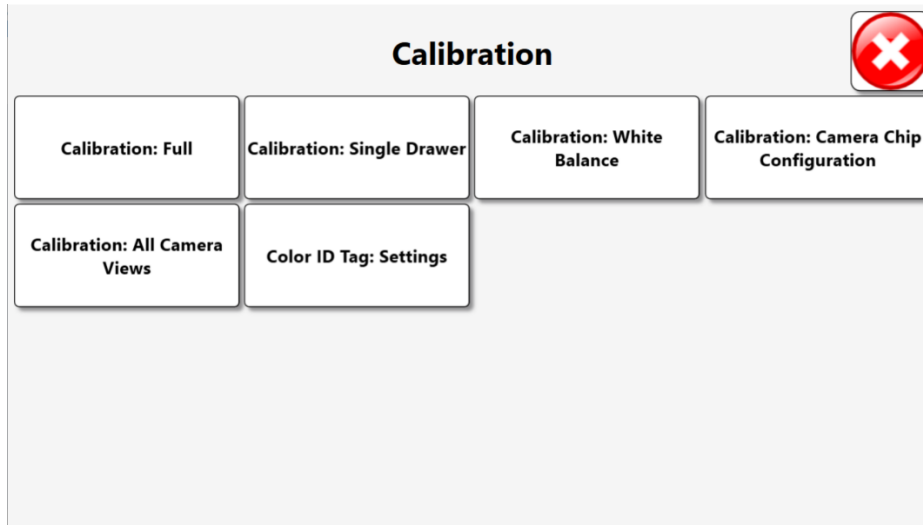


Figure 11: Calibration menu

14. Scan the admin badge to access Color ID Tag: settings function.

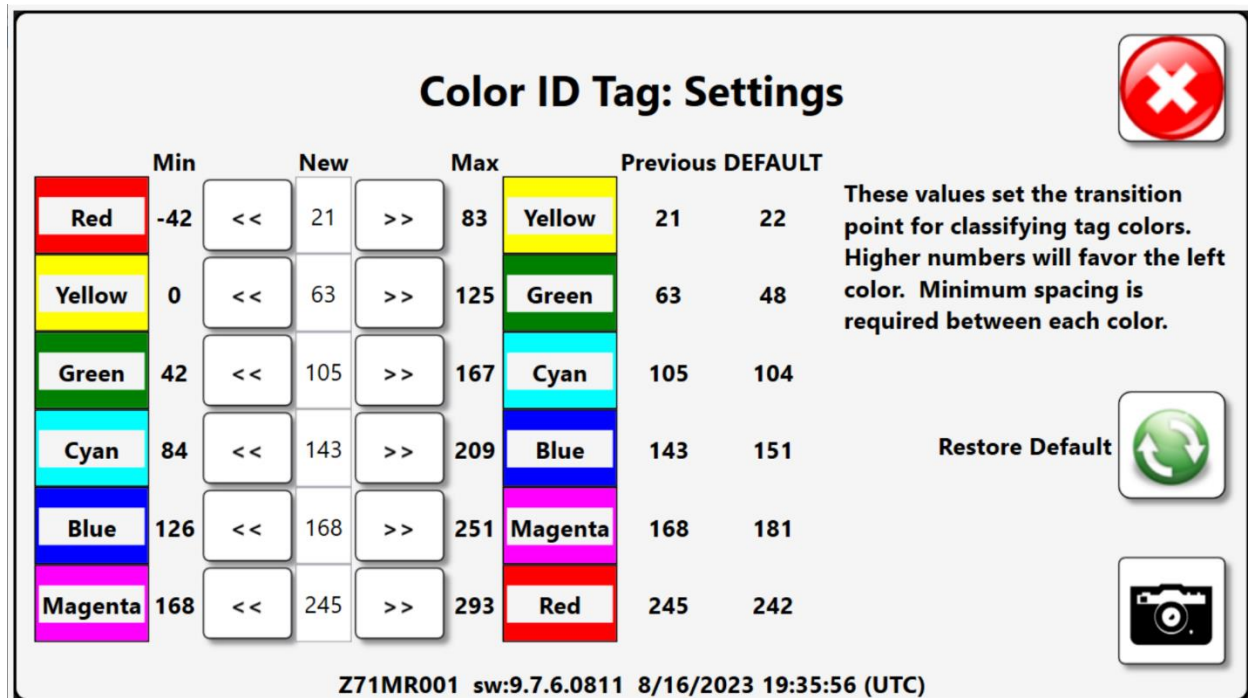


Figure 12: Color ID Tag: Settings screen

15. Press the camera icon in the lower right corner to launch the all camera view screen.
16. Click the image for camera 1 to launch the individual camera view screen.
17. Using the Brightness buttons, adjust the camera exposure to the same value used in the previous step.

18. Open the same target drawer and place the test tag in camera 1 image view. The tag edges should be straight relative to the displayed drawer image.
19. Press the hue histogram button  and click and drag to select the tag area.
20. Scroll down to the boundary adjust buttons. Use the $\leq/\geq$ buttons to move the white triangles at the top of the histogram dividing each color transition.

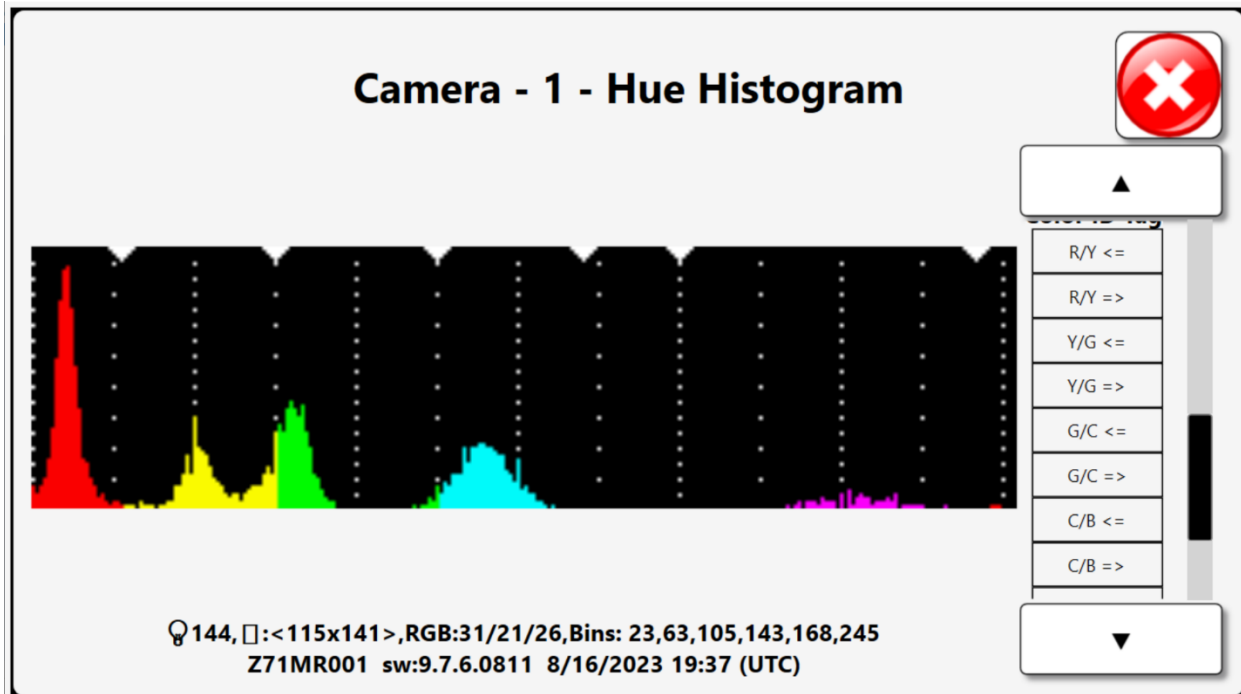


Figure 13: Color boundaries pre-adjustment.

- a. As a general rule, place the transition in the valley midway between the color peaks.
 - b. The green color has been found to have printing inconsistencies between different tag sizes even within the same book. The green peak may be squeezed up against the left or right neighboring color, and may shift this position from tag to tag. To compensate, move the green borders as close to their neighboring colors as possible. In the above image, there is a large gap between the green and cyan peaks with little to no detected pixels. Move the green/cyan (G/C) border all the way to right of this black area (to the area where the color pixels are detected) as shown in figure 15. Since the yellow and green peaks are smashed together, move the yellow/green (Y/G) transition into the low point between the two peaks. If there is black separation between green and both neighboring colors, set the (y/g) (g/c) borders just at the edge of the neighboring color detection, giving a wide black border on both sides to the green peak.;
 - c. Dark blue tag colors are not used in lower number tag books. If there is no plan to use blue in the future, the transitions involving blue (C/B, B/M) can be cheated away from the visible color peaks towards blue.
21. After all transition points are adjusted, press the histogram button to return to normal live view.

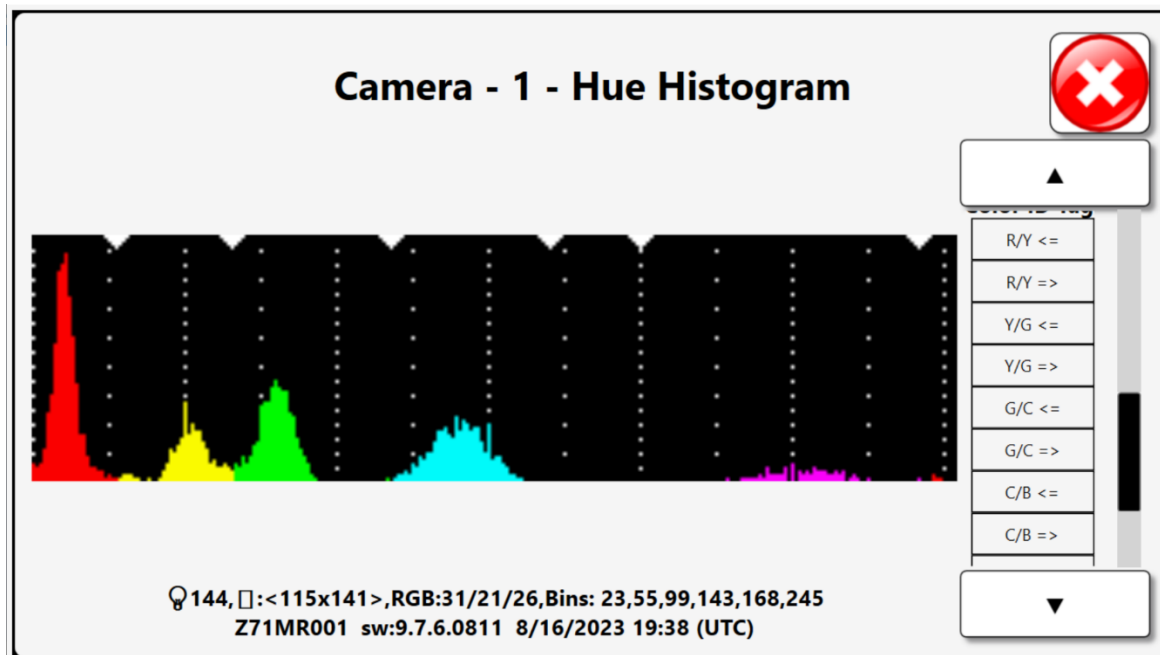


Figure 14: Color boundaries post adjustment

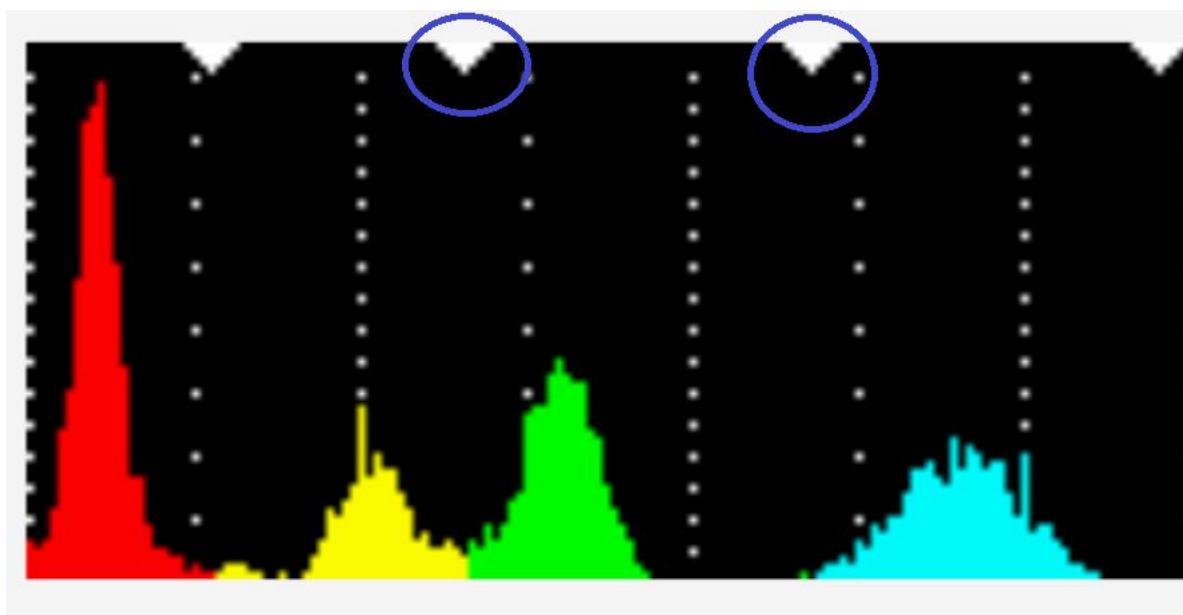


Figure 15: Color boundaries post adjustment, detail showing green border compensation targets.

(Optional)

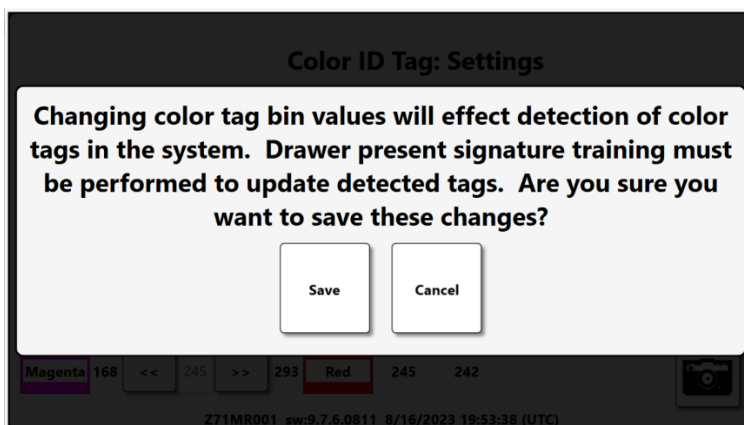
You can press the color tag debug button to switch to a false color camera display. The camera will output the 'ideal' tag color as if it was detecting color ID tags. Some false color reads are expected right on the border between stripes, but a large amount of "speckles" in the actual tag stripe indicates improper boundaries.



Figure 16: False color tag output mode

Bin transition values are used for all cameras, it is NOT necessary to repeat this adjustment for other cameras.

22. Remove the reference tag and close the drawer.
23. Press the close button to return to the all camera live view screen.
24. Press the close button again to return to the Color ID tag settings screen. Any bin adjustments made should have been transferred to the on-screen values.
25. Press the Green check in the upper left corner to save the new values.
26. Click 'Save' at the are you sure prompt.



27. Wait for the hardware re-initialization sequence to start and complete.

Your toolbox should now be calibrated for optimal color tag performance. Remember that reliable color tag performance requires following all rules for sizing, placement, and orientation.