![EPIC Research Diagnostics logo]	# Camera Functions-Requirements

1.0 Purpose

The purpose of this document is to describe the requirements for the ClearView system calibration process. This process is accessed through the Camera button on the top ribbon of the ClearView Software Solution.

2.0 Scope

The scope consists of the Calibration Process Requirements as a whole, no other systems requirements are defined in this document. The initial release of this document addresses only the requirements for the core system; this will be augmented as new requirements are introduced.

3.0 Definitions

Calibration	A process to verify that the scanner is performing to a specified level.
Intensity	The measurement of the brightness of a given pixel in the captured image, it is reported as a value between 0 and 255.
Calibration Image	A graphic captured in Bitmap format that shows the image produced by the scanner when a calibration probe is in the machine. The image is captured at a resolution of 320 pixels wide by 240 pixels tall.
Tolerance	The quantity of pixels that are allowed to fail before the calibration is considered bad.
Critical Pixel	Pixels will be either marked as critical or not. The critical pixels will have a different tolerance than the non-critical pixels.

4.0 System Requirements

⚔ The calibration process must take 5 warm up images before capturing the 10 images to use in the actual calibration calculation process.

⚔ The calibration must be calculated using 10 sample images captured sequentially.

⚔ The delay between capture should be approximately 2 seconds.

⅄ The calibration process will be accessible to all users.

⅄ The button to access the calibration process must appear on the main menu.

⅄ A tolerance value for the number of non-critical pixels that may fail should be stored in the system and it should be configurable.

⅄ Calibration is required before a scan can be performed under the following circumstances:

    ⅄ If 24 hours have elapsed since the last calibration process has been performed.

    ⅄ If more than 4 hours have elapsed since the device was last accessed (aka. a scan was performed).

⅄ The date and time of a successful calibration as well as the images associated with the calibration must be stored in the database. No record of an unsuccessful calibration needs to be maintained.

⅄ The calibration process should be controlled by a single button available to all users labeled 'Auto Calibration'. Clicking this button should do the following without user input:

    ⅄ Collect 5 warm up images.

    ⅄ Collect 10 images to use in the calibration process.

    ⅄ Perform the calibration calculation on all images.

    ⅄ Determine pass or fail status.

    ⅄ Persist data if successful.

⅄ Present the user with a progress indicator of some sort so they are aware of where they are in the process.

⅄ The process must prevent the user from exiting the process once it has begun until a final result has been reached.

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⚔ The administrator user only, should be able to manually load calibration images, bypassing the auto calibration process. Once the user has added the images, a button to perform the calibration calculations should be available.

⚔ The calibration process should not be accessible unless a scanner is attached to the system. If no scanner is found, a message should be displayed indicating such.

⚔ The calibration dialog should allow the 10 captured images to be seen during the calibration process.

⚔ Calibration can be re-run at any time and for as many times as the user desires. Only the last successful calibration will be used for analysis purposes.

⚔ If a calibration process fails, a message should be displayed to the user. In addition the criteria that caused the failure should be placed in the alerts section of the application so they can be reviewed if necessary. The criteria would consist of the pixel location that failed and how it failed (high or low).

⚔ The intensity range for all pixels must be persisted in a table in the ClearView database. A row for each of the 320x240 pixels must exist. The high range and low range must also be contained in the table as well as a critical bit.

⚔ The calibration calculation is defined as follows:

   ⚔ For each pixel in the 320x240 matrix, compare it to the corresponding limits established in the Calibration Pixel Limit csv file (dated 5/24/11) supplied by the Bio-statistics team. The intensity of the pixel must fall between the high and low range, if it does not, it is considered a failure.

   ⚔ The routine will keep track of how many pixels fail and whether or not they are critical.

   ⚔ If any of the critical pixels fail, the image will be considered invalid and the calibration process will fail.

   ⚔ If there are failures in the non-critical areas of the images, a tolerance of 10 pixels will be allowed before the image will be considered a failure.

   ⚔ The same process will be performed on all 10 images that have been collected.

✦   If none of the 10 images fail, the calibration is considered a success.

✦   When a successful calibration is obtained, the images and a reference to the calibration is stored in the database. All scans performed after the calibration will reference the calibration.

✦   Upon a successful calibration, the images should be passed to the Matlab engine to generate the values necessary for the NS calculation.

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Document Revision History

Version Number:	Description of Change:	Date:	Updated by:
000	Introduction		A. Mason