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C-Star Calibration

Date **12.8.16**	S/N# **CST-854DR**		Pathlength **25 cm**

	Analog output	Field recalibration 25 March 2018	Field recalibration * 06 April 2018
V_d	**0.058 V**	.05617	.05617
V_{air}	**4.757 V**	4.66370	4.577 *
V_{ref}	**4.657 V**	4.57875	4.61538

* Unable to obtain a stable air reading.

Temperature of calibration water   **20.9 ℃**
Ambient temperature during calibration   **21.9 ℃**

Relationship of transmittance (Tr) to beam attenuation coefficient (c), and pathlength (x, in meters): **Tr = e^{-cx}**

To determine beam transmittance: **Tr = (V$_{sig}$ - V$_{dark}$) / (V$_{ref}$ - V$_{dark}$)**

To determine beam attenuation coefficient: **c = -1/x * ln (Tr)**

$$M = \left(\frac{T_w}{w_0 - y_0}\right) * \left(\frac{A_0 - y_0}{A_1 - Y_1}\right)$$

$$B = -M * Y_1$$

V_d	Meter output with the beam blocked. This is the offset.
V_{air}	Meter output in air with a clear beam path.
V_{ref}	Meter output with clean water in the path.

Temperature of calibration water: temperature of clean water used to obtain V$_{ref}$.
Ambient temperature: meter temperature in air during the calibration.

V_{sig}	Measured signal output of meter.

$$\boxed{Factory\ M = 21.7440}$$
$$\boxed{Factory\ B = -1.2610}$$

25 March 2018
Vair - only recalibration

$$M = \left(\frac{100}{4.657 - .058}\right) * \left(\frac{4.757 - .058}{4.66370 - .0561?}\right)$$

$$M = \left(\frac{100}{4.599}\right) * \left(\frac{4.699}{4.60753}\right)$$

$$M = 21.743857 * 1.01985$$

$$\boxed{M = 22.1755}$$

$$B = -22.1755 * .05617$$

$$\boxed{B = -1.2456}$$

25 March 2018
Vair & Vref recalibration

$$M = \left(\frac{100}{4.57875 - .05617}\right) * \left(\frac{4.66370 - .0561?}{4.66370 - .0561?}\right)$$

$$M = \left(\frac{100}{4.52258}\right) * \left(\frac{4.60753}{4.60753}\right)$$

$$M = 22.11127 * 1$$

$$\boxed{M = 22.11127}$$

$$B = -22.11127 * .05617$$

$$\boxed{B = -1.2413}$$

These are the values in use for Revision M
AT 39-06

06 April 2018
Vair & Vref recalibration

$$M = \left(\frac{100}{4.61538 - .0561?}\right) * \left(\frac{4.577 - .05617}{4.577 - .05617}\right)$$

$$M = \left(\frac{100}{4.55921}\right) * \left(\frac{4.52083}{4.52083}\right)$$

$$M = 21.93362 * 1$$

$$\boxed{M = 21.93362}$$

$$B = -21.93362 * .05617$$

$$\boxed{B = -1.23201}$$

7/26/11