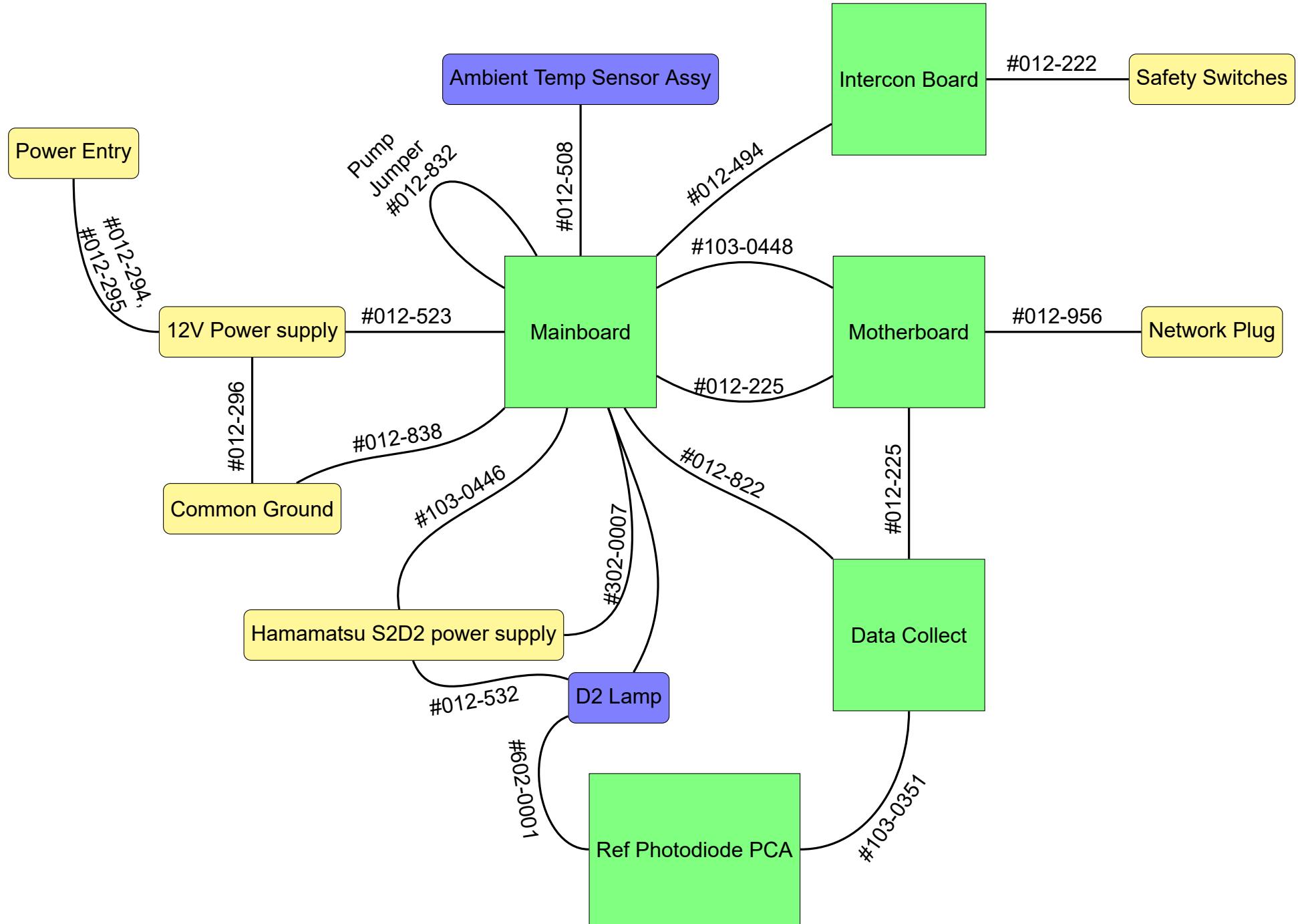


Mini-Maurice de0002 fixture notes

Contents

1	Rough D2 Fixture Schematic	2
2	BOMs	3
2.1	Toplevel Parts	3
2.2	Reference Optics Assembly	3
2.3	103-0076 D2 Lamp Assembly	3
3	Software notes	4
3.1	Size Instrument Implementation	4
3.1.1	Setting the Instrument Type	4
3.2	Lamp base values	5
3.3	Python access modification	5
4	Operational Temperatures	6
5	Build Layout Pictures	6

D2 fixture schematic



2 BOMs

2.1 Toplevel Parts

Item #	Item name	Quantity
012-494	intercon cable	1
012-225	usb a2b cable	2
012-832	pump jumper	1
012-956	network cable	1
103-0270	data collect	1
399-0040	ssd	1
103-0034	motherboard	1
103-0278	mainboard	1
103-0448	sbc power	1
012-859	ground cable	1
103-0446	d2 control cable	1
602-0001	fiber optic	1
103-0076	d2 lamp assembly	1
332-0017	intercon pca	1
****	size optics assembly	1
012-139	power entry	1
008-147	power panel	1
012-295	ac ground	1
012-830	rj45 coupler	1
011-766	fuse	1
012-851	ac power	1
012-296	power supply ground	1
012-523	main power	1
012-508	ambient temp assy	1
002-359	mounting bracket	1
008-021	power bracket	1
008-022	power bracket	1
012-390	power supply	1
008-004	base	1
406-0022	Jess top enclosure	1
406-0023	Jess door	1
050-495	door stiffener	1
008-087	switch	2
012-222	switch cable	1
008-093	hinge lower	1
008-094	hinge upper	1
405-0017	hinge middle	1
050-494	switch bracket	1
065-033	nuc comp	1
065-051	Monitor	1
055-161	Keyboard & Mouse	1

2.2 Reference Optics Assembly

item number	item name
103-0076	Assy, Maurice D2 Lamp, Heated
001-465	CABLE TIE, BLACK, .10 X 6.38 IN LONG
006-133	LBL, HOT SURFACE
010-806	SPCR, UNTHEADED, #6 X 1/8, NYLON
012-528	PCA,LAMP-EXTENDER
012-532	CBLASSY,LAMP-EXTEND
040-856	SCREW, SHCS, M2.5 x 4, SS
041-326	SCR, M2.5 X 8, SHCS, SS NY/P
070-090	Kifer Illumination Lamp Cover
103-0379	CBLASSY, D2 Lamp Heater
104-0060	KIT, D2 LAMP, MAGNETIC SHIELD
23-14842-00	cable tie mount .75W X.75W X
302-0007	CBLASSY D2 LAMP HEATER POWER
319-0022	D2 Lamp Power Supply, 4.0V Filament
407-0006	INSULATION, D2 LAMP, COVER, ADHESIVE-BACKED
408-0006	COVER, INSULATED BOX, D2 LAMP
408-0011	Bracket, D2 Lamp Holder
41-15156-03	SCR, M2.5X6mm, btn hd skt cap
499-0006	Lamp House w/ SMA Connector & Collimating Optics, No Shutter, Heat Rated
604-0001	Lamp, DEUTERIUM, 1.1mm

2.3 103-0076 D2 Lamp Assembly

Item number	Item name	Quantity
070-022	optic ref	1
070-129	optic ref	1
012-476	photodiode	1
055-421	shoulder screw	1
070-134	lever	1
012-041	ref pca	1
055-080	220 nm filter	1
070-026	filter holder	2
070-032	entry block	1
055-091	lens	2
055-082	lens	2
070-021	ref mirror	1
055-150	fiber adaptor	1
070-033	fiber block	1
070-124	lock nut	1
070-132	backing shell	1
070-133	cover	1
055-420	spring	1
055-422	screw	2
070-135	clamp	2
055-410	screw	1
055-418	spring	1
055-419	setscrew	1
055-273	setscrew	2

3 Software notes

3.1 Size Instrument Implementation

The first thing to accommodate for in the build once the fixture boots is to change the type of instrument to a “Maurice-S” Size instrument.

This keeps the CANBUS from defaulting on nodes that are not attached to the instrument.

3.1.1 Setting the Instrument Type

The instrument by default is set to static IP; the Service Console is brought up in Firefox with the address 172.30.1.1:8080. From the service console, select the hyperlink [Manufacturing Setup](#), then the Serial # can be changed to “de0002” and from the drop down, the instrument type is set to “kifer_size” and both the serial number and hardware configuration are saved from this page.

The screenshot shows a browser window titled "Manufacturing Setup". The URL in the address bar is "kf1026:8080/mfgSetup". Below the address bar, there is a link "Up to main". The main content area is titled "Manufacturing Setup". It contains a "Serial #" input field with "kf1026" and a "Save Serial #" button. A note below says "After saving the serial number, power-cycle the instrument. It will use the new serial number as its hostname." Below this, there is a dropdown menu showing "kifer_no_mixing". The next section is titled "cIEF Filter Wheel Configuration" and contains a table:

Position	Filter Name	Installed
1	Fluorescence	<input checked="" type="checkbox"/>
2	FL458nm	<input type="checkbox"/>
3		<input type="checkbox"/>
4	Absorbance	<input checked="" type="checkbox"/>
5		<input type="checkbox"/>
6		<input type="checkbox"/>

Below the table is a section titled "CE-SDS BME Fan Configuration" with an "Installed" checkbox. At the bottom is a "Save Instrument Type and Hardware Configuration" button.

3.2 Lamp base values

By default, when the instrument is first started, the [Settings Directory](#) is empty. In order to get the values of the ADC counter to match the voltage coming from the photodiode integration chip, calibration is performed, creating the “point_detector_ref_dark_value” and “point_detector_data_dark_value” to set the zero reading of the ADC counter. Once the calibration is performed, the [calibration.ini](#) file is generated and stored in the [Settings Directory](#). All data_collection files will use these values against which to determine the received light intensity at the photodiode.

We did not want to generate the calibration.ini file and instead chose to create one. This created file follows below:

calibration.ini

```
[optics]
point_detector_data_dark_value = 8388607
point_detector_dark_date = 2023-11-20_16:21.26
point_detector_ref_dark_value = 8388607
lamp_calibration_value = 0.701
```

The value $2^{23} - 1 = 8388607$ is used since this would be the theoretical value for a 24 bit ADC chip to read as a “zero” value from a non-illuminated photodiode.

3.3 Python access modification

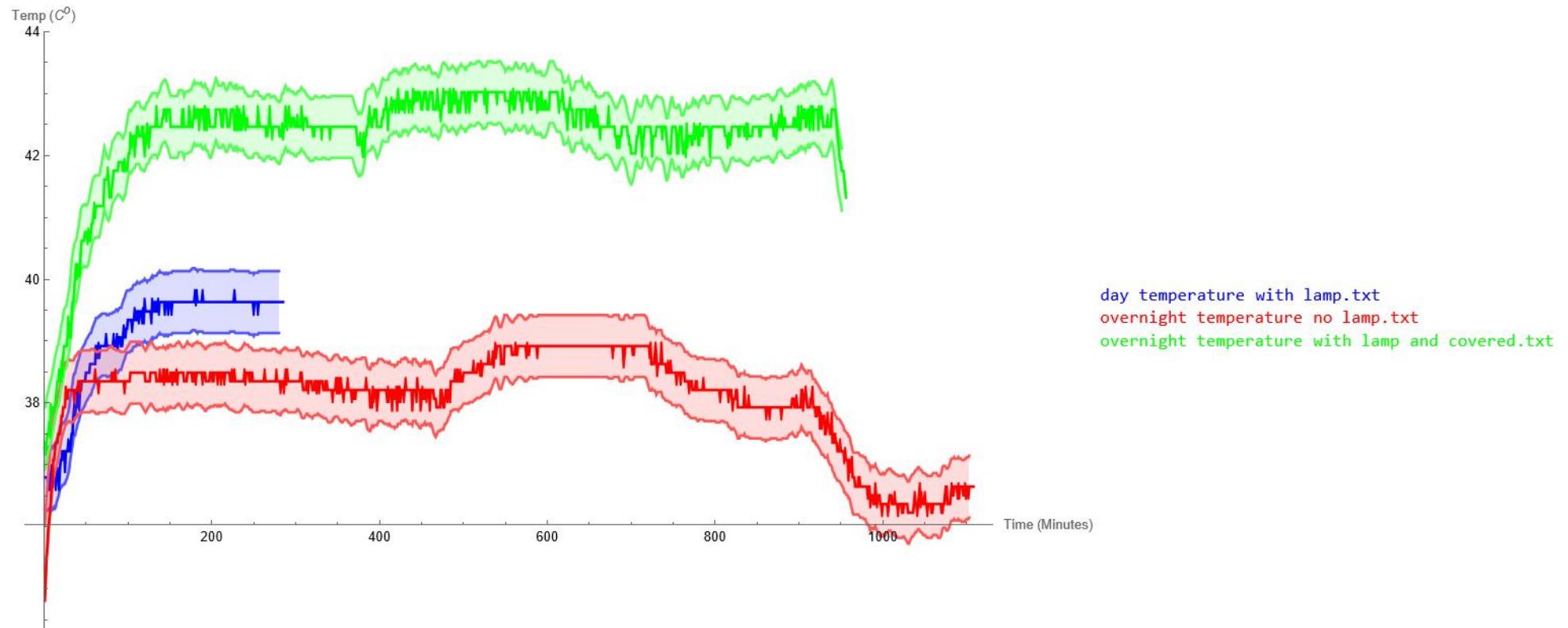
Root access to the instrument with the cbuser/firefly user/pwd combination would be unwise, so the file which has the username and password hard-coded for accessing the Python shell was modified on lines 20 & 21 as shown below.

Configuration.py: lines 19 to 21

```
19 #
20 _DEFAULT_USER_NAME = 'd2user'
21 _DEFAULT_PWD = 'Hamamatsu'
```

4 Operational Temperatures

The fixture was built with a chamber temperature thermistor mounted above and to the side of the mainboard in order to monitor the temperature of the internal electrical components during basic operation since the internals are passively cooled. The following picture shows the recorded temperatures from the [temperature.log](#) which was started manually from the calibration “easter egg” service console.



The coolest temperature was overnight with no lamp running fluctuating around 38°C, with a daytime run measuring lamp output averaging just below 40°C. The highest temperatures recorded were during an overnight run where a black cloth was draped over the fixture with lamp output being recorded; the temperature approached 43°C but did not get hotter.

5 Build Layout Pictures

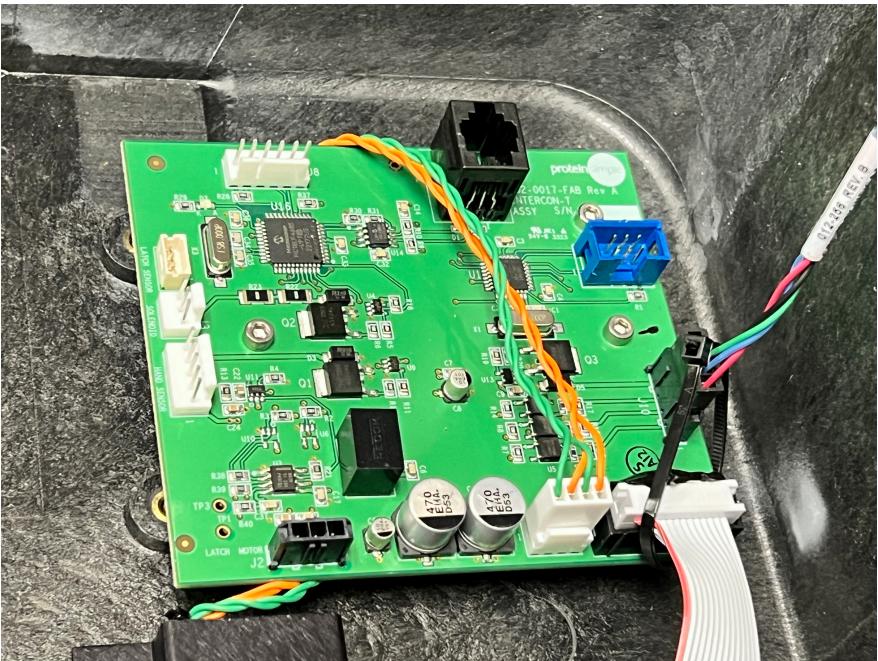
The following pictures show the build layout of the fixture, with the mix of small box enclosure + parts and the internals of a Maurice size instrument.



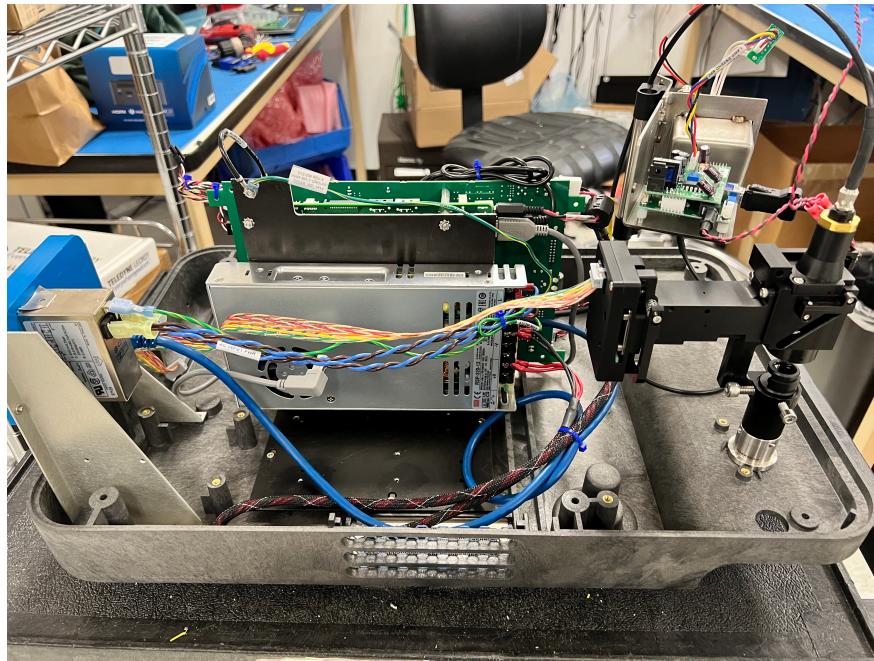
The outer enclosure of the fixture.



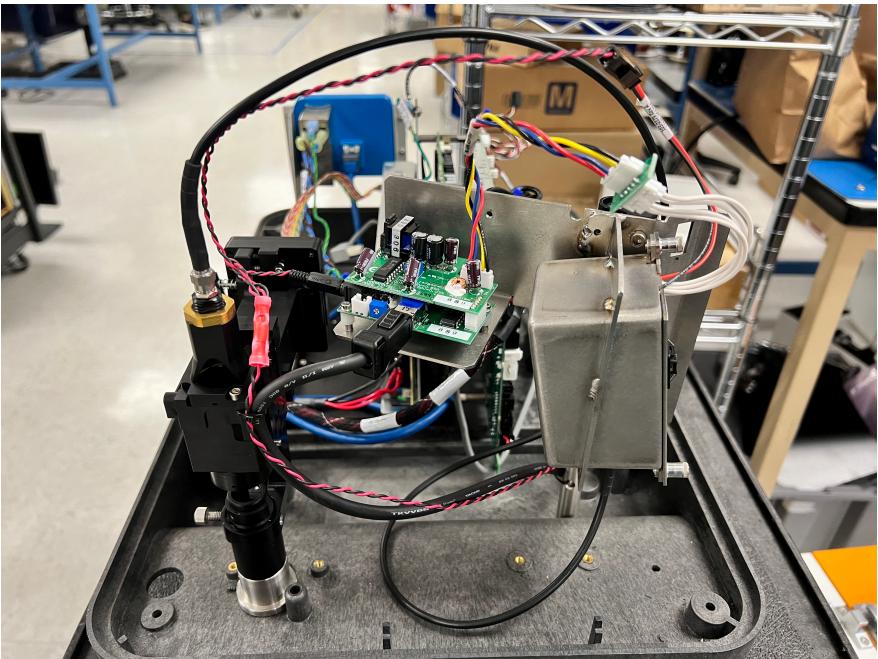
The door handle of the fixture.



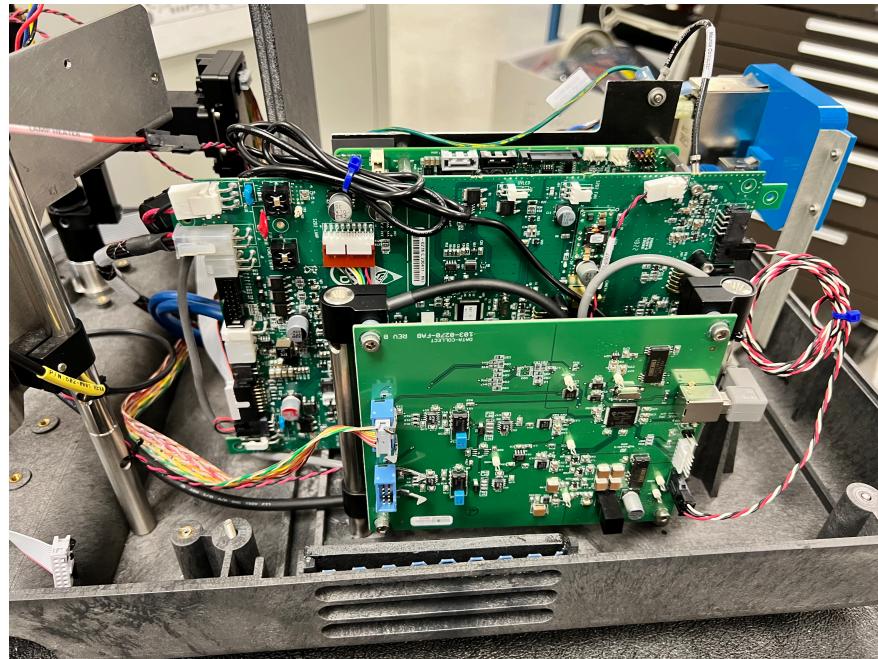
The intercon board; mounted inside the top of the enclosure.



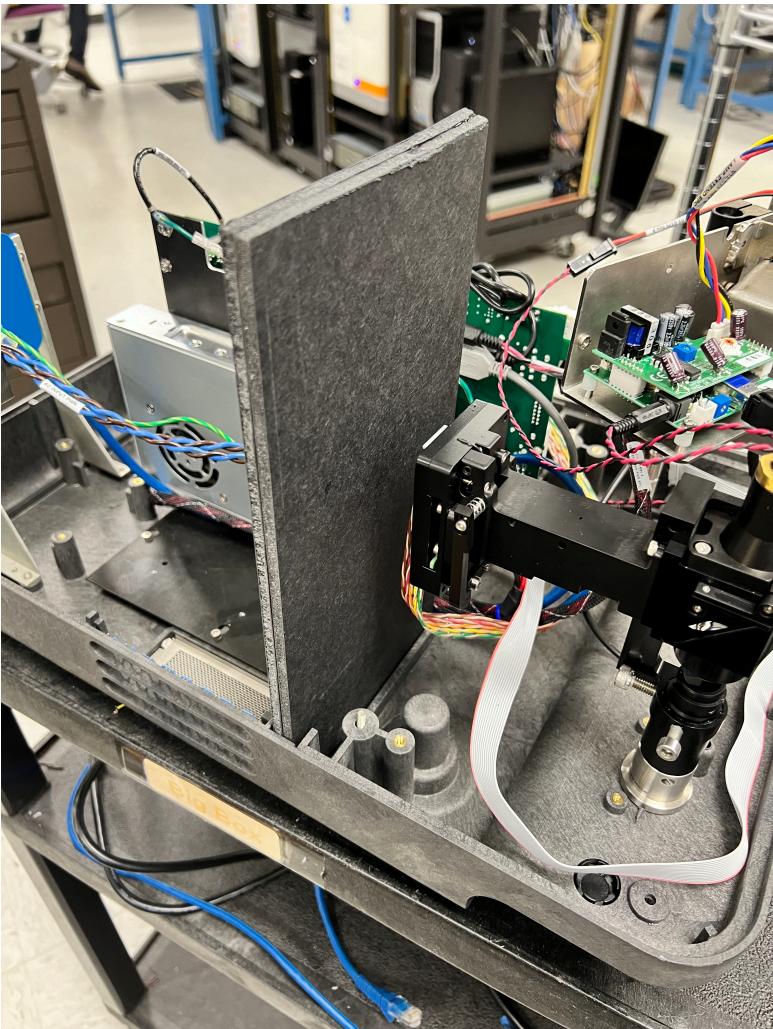
Left side view, power distribution and optics.



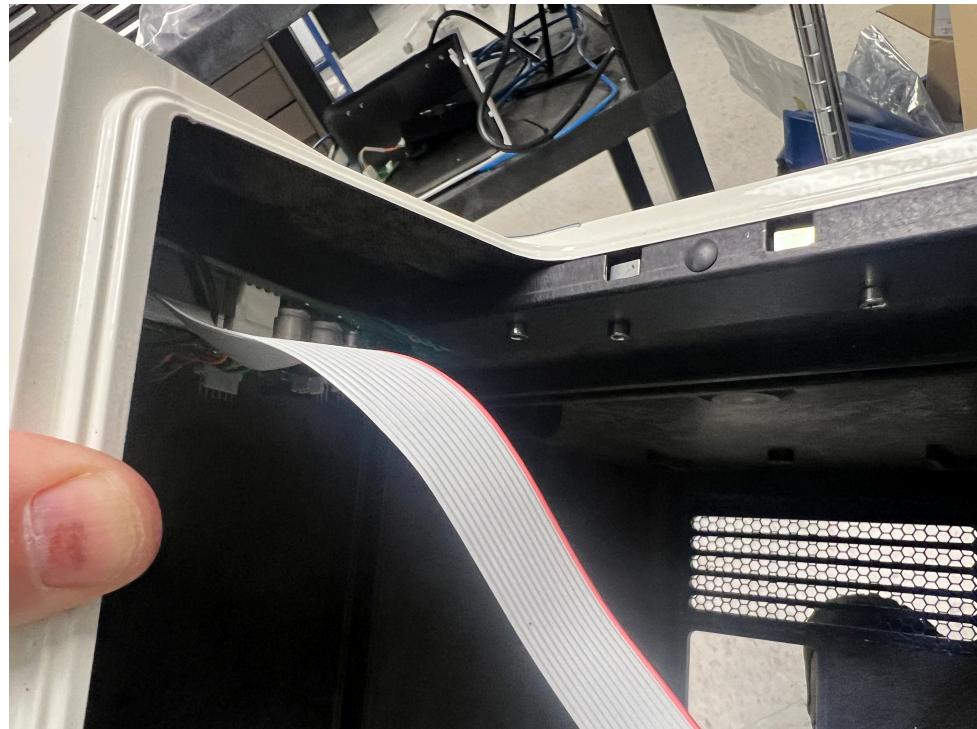
Front view, optics, lamp, & lamp power supply.



Right side view, data collect board mounted.



Light screen, made from foam board.



Location of the intercon board and intercon cable just inside the door.