



PSL EPICS user manual

LIGO-T-0900634

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In this document the EPICS screens of the PSL are described to enable LIGO people to operate them. There are 6 MEDM screens belonging to the different controll objects in the PSL: the PSL Status, the high power laser, the Diagnostic Bread Board, the Pre-Modecleaner, the Power Stabilization and the Frequency Stabilization. The current version of the document gives the status of the MEDM screens used for the 200W laser Reference System used at AEI. It is ment to describe the forseen functionality of the EPICS control.

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1 PSL Status monitor screen

On the PST STATUS page the user can see all important information about the PSL system at a glance (see Fig. 1). It is divided into six parts, the first gives an overview of the frontend and the HPO ①. The second part shows all important information about the PMC ②, with the third summarizes the information from the ISS ③. The status of the frequency stabilization is shown in the fourth section ④, at the bottom of this section a blue field links to more detailed EPICS screens for the relevant part of the PSL. As the last of the screen also shows information about the area of the laser on ⑤. At the bottom of the status screen a "close high power laser shutter"

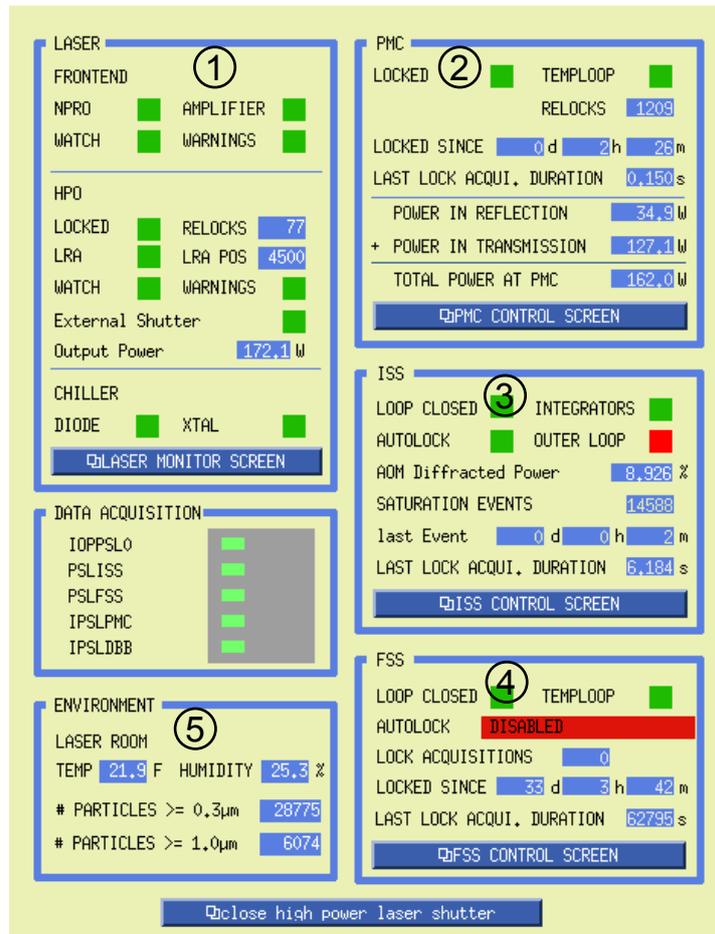


Figure 1: PSL Status monitor screen

field is located. A mouse click on this field will close the shutter of the high power laser. It is envisioned that the operators have the status screen open and can use this button to quickly turn off all laser light in the interferometer (without shutting down the full laser and hence avoid warm-up effects and drifts).

2 High Power Laser monitor screen

This screen (see Fig. 2) is used to watch all important values of the High Power Laser. There is a display of the laser like the one in the Beckhoff control of the laser. All variables are read-only. (A detailed description of the laser and its Beckhoff user interface can be found in DCC) [T-0900641.](#))

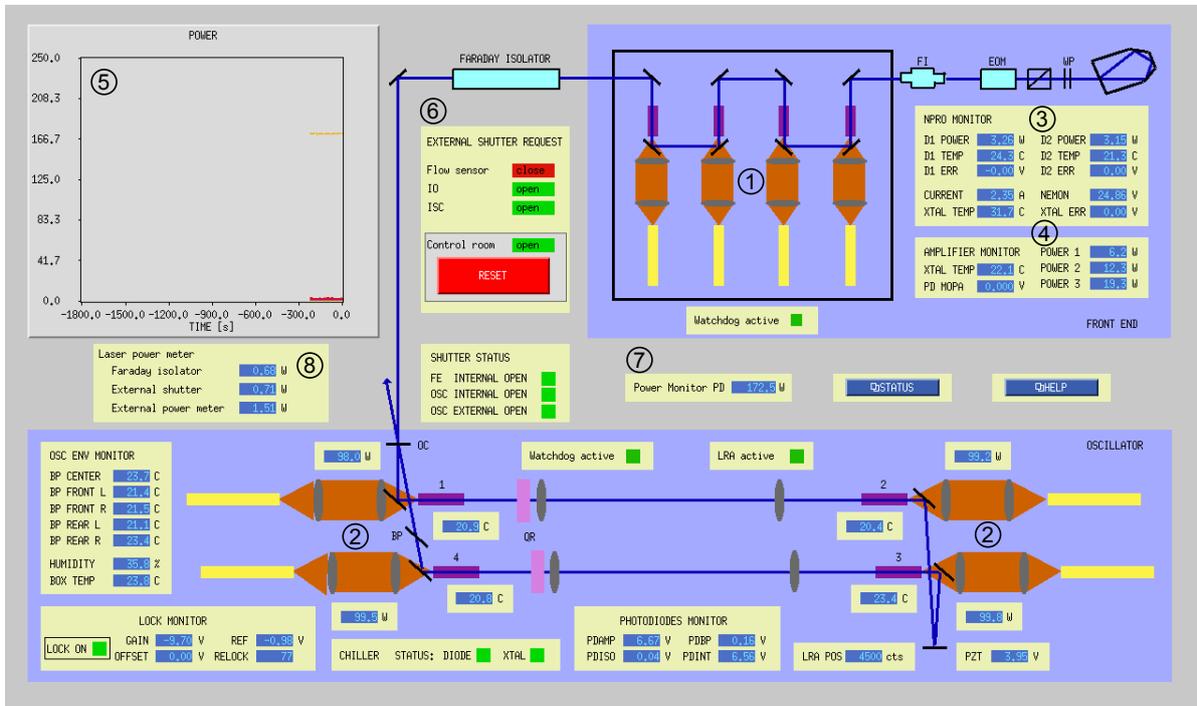


Figure 2: Main monitor screen for the high power laser

There are related displays to present more information about the different high power laser components: One of these screens, which presents the pumpdiodes of the 35W front end laser, will open by a click on ①. A second screen ② shows the important values of the diodes, which pump the high power oscillator. The detailed status of the two chillers, the diode chiller and the XTAL chiller, opens by a click on it. Similarly, information about the NPRO as displayed on the Frontend in ③ and ④. In figure ⑤ the power of the laser system is recorded. A click on the status button (located at the middle-right) will open a screen similar to the Beckhoff status screen with top-level status indicators.

3 Diagnostic Bread Board control screen

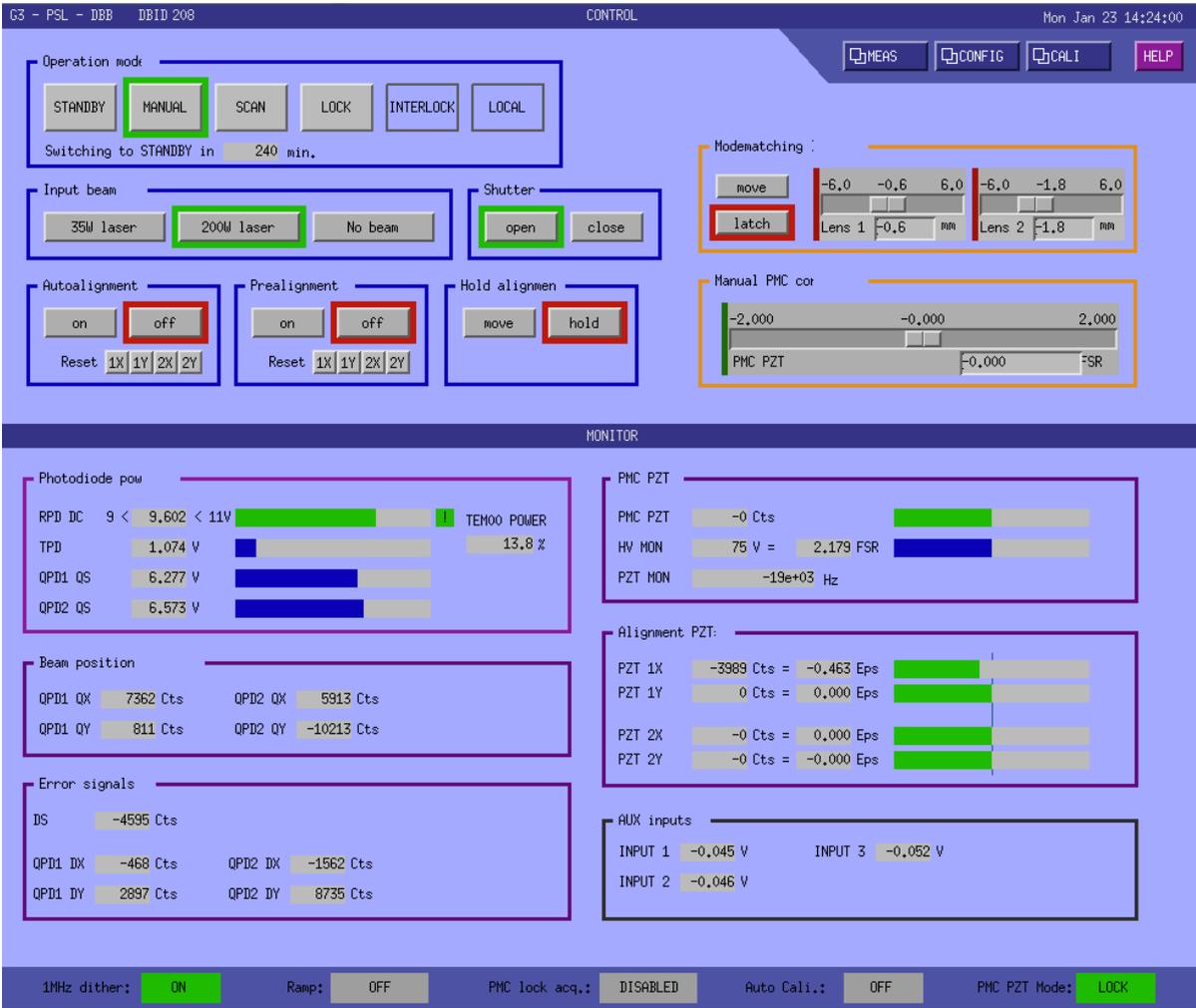


Figure 3: Diagnostic Bread Board control screen

The detailed description of this screen and the whole computer control of the DBB can be found in DCC T-0900579.

⑦ shows the high voltage signal, which is driving the PZT to keep the PMC in lock. The readouts ⑧ show the power in reflection and in transmission of the PMC. The power meter in transmission will not be available in aLIGO. A photodiode positioned in one of the other PMC ports will be used to derive a value of the power transmitted by the PMC. The summation of these two values is shown below the picture of the PMC. If the PMC is locked, is shown in the readouts ⑨.

The temperature of the PMC is controlled by a digital control loop in order to compensate for length fluctuations of the spacer and to make the PMC length follow slow frequency drifts of the laser. This loop is shown in the yellow box. The sliding controller ❶ is used to set the anticipated reference level for the high voltage signal.

The temperature control loop can be turned on and off via ❸ The sliding control ❹ is used to set the offset of the heater. The actual voltage, which is connected to the heater, is shown in the readout ❺. The temperature of the PMC is shown in ❻.

There is the possibility to start the alignment PZT ramp ❷, with a bigger amplitude when the locking ramp. It is also possible to set of the frequenz and the minimal and maximal value.

5 Power Stabilization control screen

This screen is used to control the power stabilization of the high power laser. The function of this control loop is described in DCC [T-0900630](#) as well as the circuit board documentation [T-0900631](#).

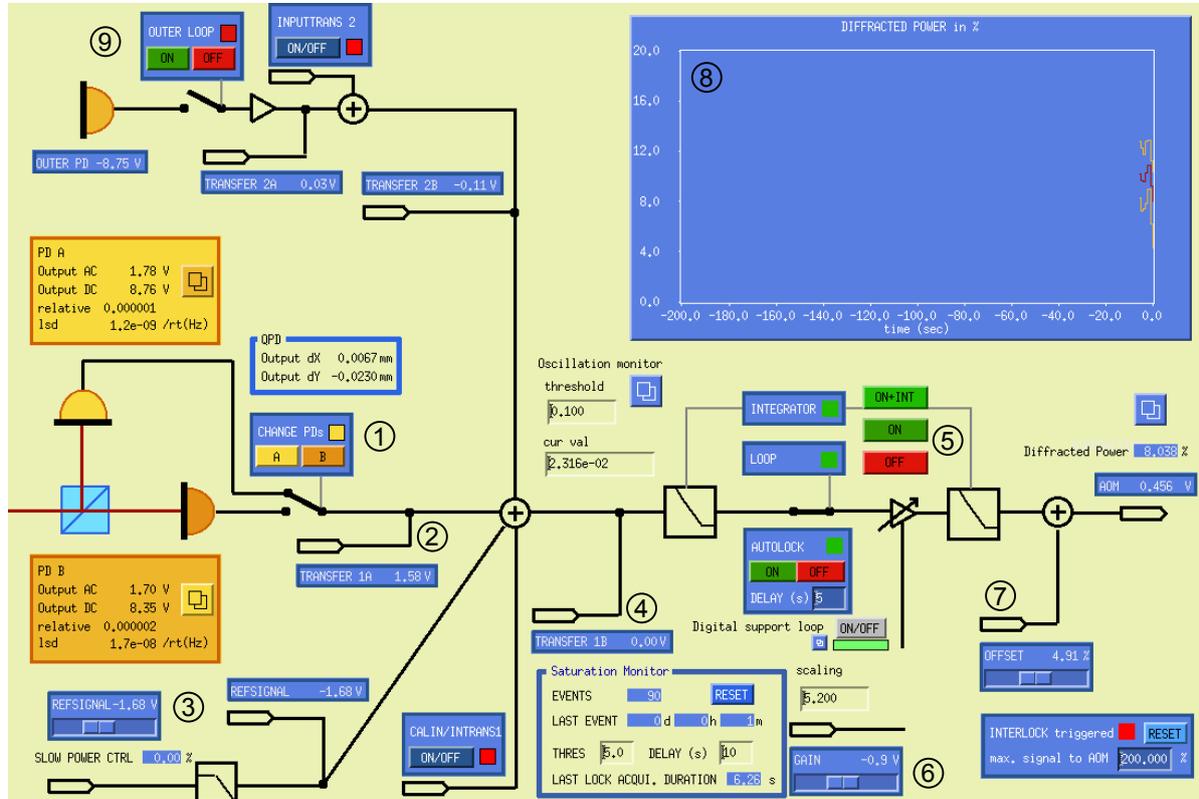


Figure 5: Control screen for Power Stabilization

The sensors of this control loop are two identical photodiodes, which are interchangeable. To decide whether PD A or PD B is the inloop photodiode the switch ① is used. The readouts ② and ④ are used to measure the transfer function of the loop. These points are connected inside the ISS servo module to fast CDS channels. ④ is also the error point of the loop. The sliding controller ③ is used to set the reference signal and the including readout shows the signal after passing a lowpass. The switches ⑤ are used to turn the lock of the loop on and to implement an integrator. Under this switch you have the opportunity to turn the system into autolock and there is also the possibility of a digital support loop. The gain of the loop can be modified using the sliding controller ⑥. The offset of the AOM can be adjusted with ⑦. The readout and the graph ⑧ show the diffracted power, which is exerted by the high power AOM. The outer loop power stabilization is implemented in this control screen as well. It can be connected and disconnected with the switch ⑨.

6 Frequency Stabilization control screen

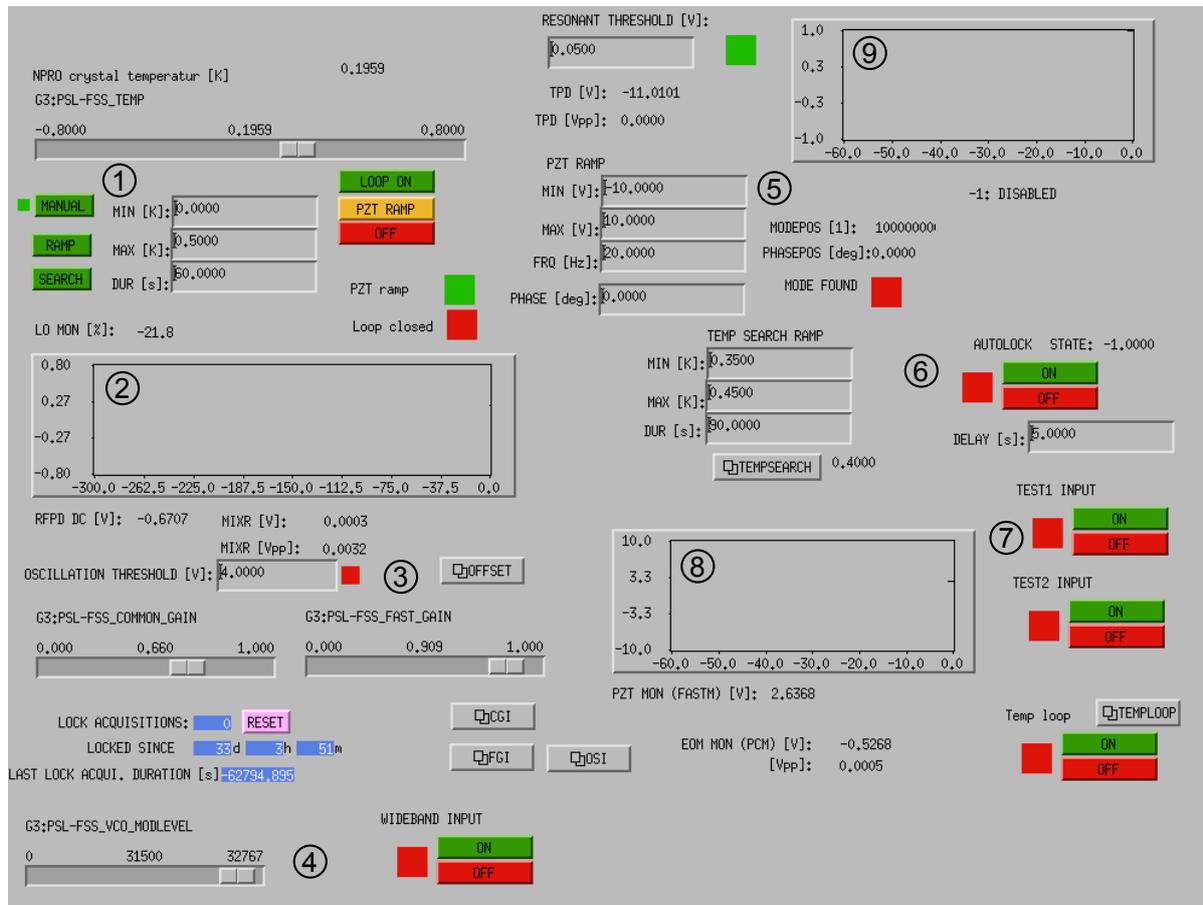


Figure 6: Control screen for Power Stabilization

This screen is used to control the frequency stabilization of the high power laser. This screen is nearly identical to the one for Initial LIGO. The temperature of the NPRO crystal can be changed by ① in two ways, one the manual mode with the sliding controller and second, a ramp with a minimum and maximum value and a time. The same procedure can be done with the PZT ⑤. The readout of the temperature over time is shown in ②.

With ④ it is possible to change the VCO modulation level. To lock the system automatically the buttons ⑥ can be used. With ⑦, additional test inputs are added. ⑧ shows the PZT movement over time.