Operation Procedures for LHTK-13 PL530 Laser Driver Board

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The PL530 driver board LHTK utilizes the ESP8266 WiFi Module Kit8 to operate the PL530 laser with TEC, supporting three operation modes: **Standalone**, **Serial Port**, and **WiFi Access Point**.

1. Standalone Operation Mode

A) Turn on the Driver Power

- Plug the +5VDC power supply into the onboard Power Jack (P1) and set the sliding switch (S1) to the **ON** position.

- Once the on-board LED indicator changes from red to green**,** press the Laser Enable Switch (S2) to activate the laser power output.

B) Laser and Heater Current Adjustment

- Adjust the laser current potentiometer (POT1) to set the laser current between 0 and approximately 470 mA. The laser current can be measured at test point KL. To measure, place a voltmeter probe across KL and GND. The laser current (mA) = measured mV $\times$ 2. For example, if the voltage at KL reads 200 mV, the actual laser current is $200 \times 2 = 400$ mA.

- Adjust the laser and heater potentiometers (POT1 and POT2) to achieve the desired laser power output. The heater current significantly impacts laser power. Slightly adjust the heater current potentiometer (POT2) to reach peak power, ideally between 60–70 mA. The heater current can be measured at test point KH. To measure, place a voltmeter probe across KH and GND. The heater current (mA) = measured mV $\times$ 2. For example, if the KH voltage reads 33 mV, the actual heater current is $33 \times 2 = 66$ mA.

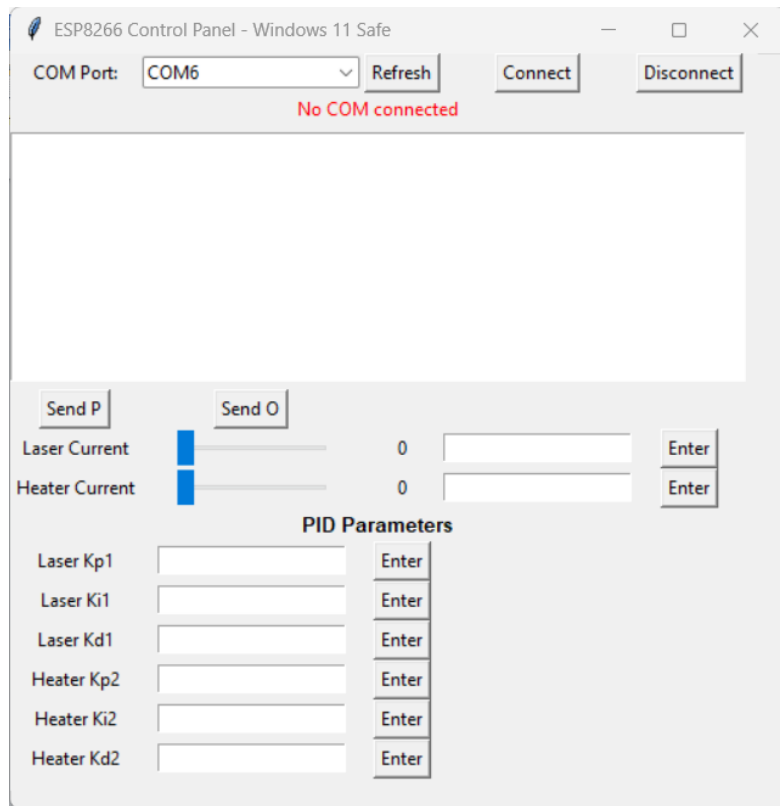- Press the pushbutton (S3) Top/Bottom to increase/decrease the heater current.

2. Serial Port Operation Mode

A) **Connect the Power Supply and the Serial Port to the Computer**

- Plug the +5VDC power supply into the onboard Power Jack (P1) and set the sliding switch (S1) to the **ON** position

- Use an **A male to micro B** male USB cable to connect the Kit8 to a computer.

B) Set UP the Control Panel

- Download the serial port **Control Panel** from www.pdcontrol.com
- Locate item **#19** and click **"Download Control Panel Kit8-13.**
- Unzip the downloaded file and open **Kit-13.exe**. A Control Panel window will appear, as shown in the image below.

C) Set the COM Port

- Select the serial port number as **COMx**, where **x** represents the actual serial port number.
- Click **"Connect."** If the port number and connections are correct, the message **"Connected to COMx"** will be displayed.

D) Enable and Disable Laser Power Output

- Click the **"Send P"** button to **enable** the laser power output.
- Click the **"Send O"** button to **disable** the laser power output.
- Once the laser enabled, the real-time laser and heater current values as well as PID parameters will be displayed in the background window.

E) Set Laser and Heater Currents

- Use the sliders or enter a number between **0 and 4000** to set the '**Laser Current**' or '**Heater Current**,' adjusting the current from minimum to maximum levels.
- **Note:** The final laser and heater current outputs are the sum of both the potentiometer settings and the Control Panel adjustments.

Please notice that the final laser current and heater currents power output are the sum of the potentiometer and this panel settings.

F) Using PuTTY or Hyper Terminal Serial Port Controls

- Set the Baud Rate to **115200** and select the correct serial port number when using PuTTY or Hyper Terminal.
- In the input prompt window:
- Type "**p**" and press Enter to turn ON the laser power output.
- Type "**o**" and press Enter key to turn OFF the laser power output.
- Type "**L**" (uppercase or lowercase) followed by a number between **0 and 4000**, then press Enter to set the laser power level from minimum to the maximum.
- Type "**h**" followed by a number between **0 and 4000**, then press Enter to set the heater current level from minimum to the maximum.
- **Note:** The final laser and heater current outputs are determined by the sum of the potentiometer settings and the numerical values entered via the serial port.

G) Modify the Laser and Heater PID Parameters

- The default PID parameters for the laser and heater control circuits are set as follows:
- Laser current PID parameters:
- Kp1 = 0.05, Ki1 = 0.1, Kd1 = 0.
- Heater PID parameters:
- Kp2 = 0.1, Ki2 = 0.5, Kd2 = 0.
- Because a variety of lasers, TECs, and thermistors may be used in different user applications, some PID parameters may need to be adjusted to match the specific
- To change a parameter, enter a new value in the corresponding parameter field and press the **Enter** button. The new value will be stored in the **EEPROM** and used by the control circuits.

3. WiFi Access Point Mode

A) Connect the Board to the Power Supply

- Plug the +5VDC power supply into the onboard Power Jack (P1) and set the sliding switch (S1) to the **ON** position.

B) Set Up WiFi-Enabled Device

- Use a WiFi-enabled device (such as a smartphone or laptop) to connect to the driver's network.

  Network ID: **Kit8-12-xx** (where **12** denotes driver board Revision. 12, and **xx** is the code serial number).

  Password: **12345678**.

- Once connected, open a web browser and navigate to **192.168.1.1**, to access the control webpage.

- Press the **ON/OFF** button to toggle the laser power output ON or OFF.
- Press the **PR UP** or **PR DN** button to increase or decrease the laser current.
- Press the **Heater UP** or **Heater DN** button to increase or decrease the heater current.
- Press the **Update** button to refresh the laser and heater current values and temperature readings.

4. **Operation Without TEC Temperature Controls**

- To protect the laser diode from overheating, the TEC/Thermistor control circuits disable both the laser and heater current outputs.
- For users testing or evaluating the PL530 laser without a TEC and Thermistor, the temperature protection can be temporarily bypassed by shorting the pins of J0, or by installing a 0-ohm resistor at R33. This should be done only temporarily for short-term testing and evaluation purposes.
- The PL530 must be mounted on a heatsink for the test.

R33   J0