Quick-start reference guide Chameleon Discovery Laser System

CONTENTS

1.0   PURPOSE

This purpose of this document is to detail the installation requirements and to serve as a quick-start guide for the Chameleon Discovery system for Coherent Service.
This document is not intended to act as a replacement for the Discovery Operator's manual. Users are expected to refer to the Operator's manual before switching on the laser.

2.0   SCOPE

This document reflects current practice for the Chameleon Discovery system and was first released in February 2015.
The intended audience is Coherent Field Service Engineering.

3.0   SYSTEM CONFIGURATION

Component	Weight, kg	Dimensions (LxWxH), mm
Laser head	90	821 x 445 x 287
Power Supply	12	483 x 418 x 132
MRU	12	478 x 491 x 55
Chiller	32	400 x 484 x 267

The power supply contains all electrical control & DC supplies to the head. The connections are military style electrical cables 3m in length. There are no optical connections from the PSU to the head.
Maximum electrical consumption of the system is in the range of 2300W, typical 1000W.

4.0   SYSTEM UTILITY AND ENVIRONMENTAL REQUIREMENTS

Please refer to the datasheet and user manual for specifics.
The system requires 3 x single-phase power outlets, 90-250Vac autoranging, 50-60Hz.

5.0   SHIPPING CONTAINERS

The system comprises five pieces shipped as follows:

Laser Head   – Wooden Crate (shown above)
Chiller   – Cardboard box
MRU   – Cardboard box
PSU   – Cardboard box
CoolFlow   – small cardboard box

| Shipping Dimensions		
Item	Weight, kg	Dimensions, LxWxH, mm
Laser head	165	1230 x 840 x 730
Power supply	12	580 x 550 x 210
MRU	12	580 x 550 x 210
Chiller	24	650 x 600 x 300
Coolflow	6	200 x 200 x 300
Total	**219**	

6.0   DE-CRATING

Remove the top cover of the wooden crate and turn it over. This forms a ramp on which to unload the laser head.

- Remove one end of the crate and fit the 'ramp' as shown. Note that the nearest two clips on the side panels (arrowed) also have to be removed in order for the ramp to fit.
- Release the brakes on the wheeled cart and carefully roll the laser head down on to the floor. Do not 'bump' the laser down off the end of the ramp.
- NB: Remember to check underneath the cart for ancillary items, e.g. accessory kit, handles, et cetera.
- Roll the laser head on the wheeled cart to the install location. Removable handles are provided to assist in the final lifting of the laser head on to the optical table. They can be attached to the front and rear bulkheads using the M8 bolts provided in the accessory kit.

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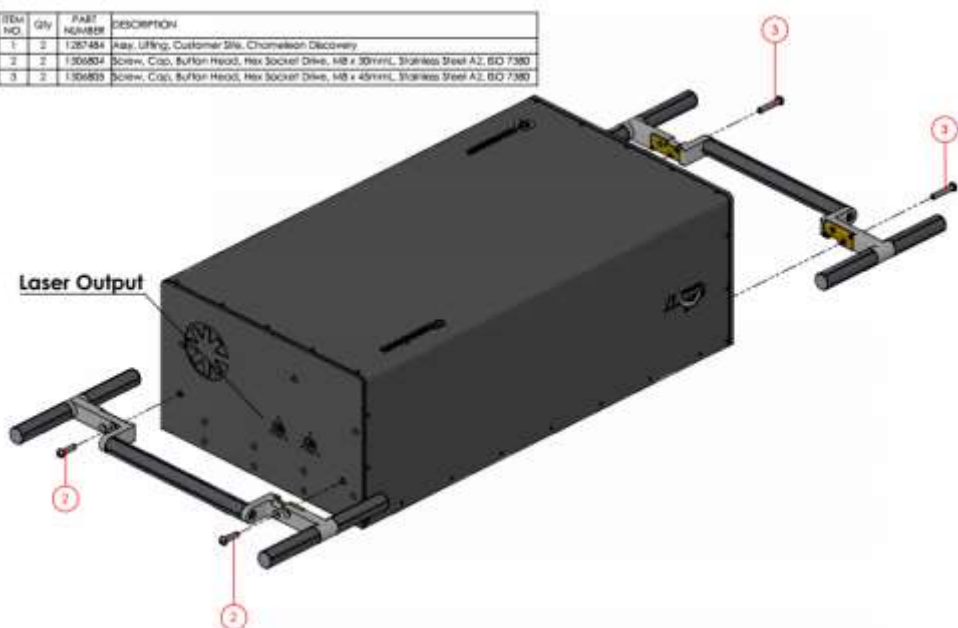
7.0   INSTALLATION

7.1   TOOLING

- APE Wavescan spectrometer
- Coherent PowerMax power meter (min. 10W).

- 1% pick-off beam sampler
- Assorted standard laser installation hand-tools
- Discovery Service GUI
- Discovery Customer GUI (available at:
http://www.coherent.com/products/?2171/Chameleon-Discovery)

7.2   SYSTEM CONNECTIONS

7.2.1 PSU CONNECTIONS

- The two electrical umbilicals have different pin-configurations, are directional, and are keyed to assist with connections. Once located, turn to hear an audible locking click noise.
- The interlock cable PSU to MRU supplied within the Discovery accessory kit must be fitted to prevent the user running the Discovery with the MRU switched off. In the event of an MRU power failure the user interface will display an interlock error and the PSU fault LED will illuminate. Refer to 'MRU Connections' below.

- Ensure the correct fuse is inserted and the fuse holder is oriented for the correct regional mains rating. The arrow indicates the contact end for the fuse. Lasers should be received with both the 4A & 8A fuses already inserted in the holder or with the 8A fuse enclosed within the PSU accessory pack.

7.2.2 MRU CONNECTIONS

- Connect the MRU X1 hoses, same connection type as Chameleon.
- Ensure that the interlock cable PSU to MRU supplied within the Discovery accessory kit is fitted as shown, and install the door contact override link supplied within the MRU box.
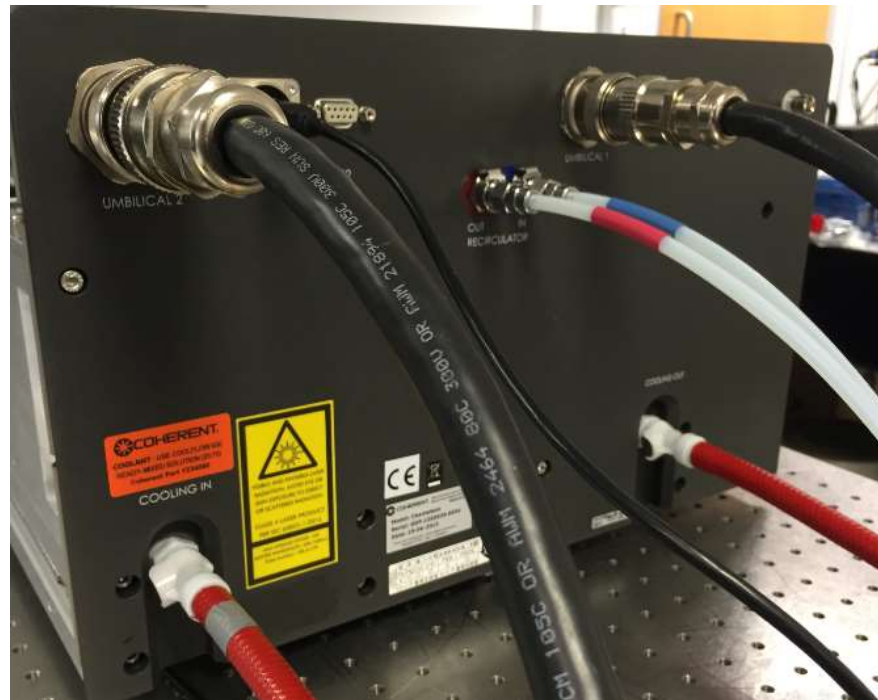
7.2.3 CHILLER CONNECTIONS
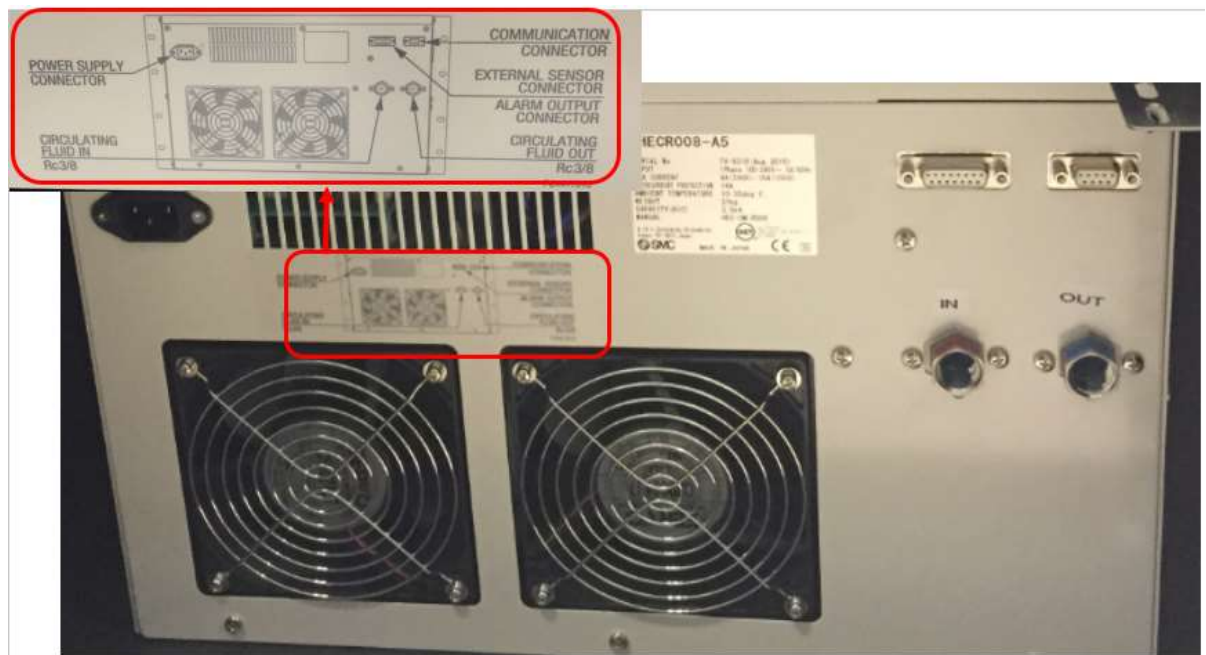
- Connect the chiller hoses, same connection type as Chameleon. The In / Out connectors are identified on the label as shown.
- Using the funnel and short red hose piece supplied within the Discovery accessory kit, fill the chiller with CoolFlow between the H (high) and L (low) indicators.

- After connecting at the head end – <u>refer to next section for orientation!!!</u> - turn the chiller on. CoolFlow will be pumped through the hoses to the head and require refilling at least one more time. Turn the chiller off, re-fill to above the L indicator, then turn on again to reactivate the pump. Leave the chiller filled to below the H line.

7.2.4   DISCOVERY LASER HEAD CONNECTIONS

- Connect Umbilical 1 and Umbilical 2 into their locating sockets and turn to hear the contact click-lock.
- Connect MRU hoses, same as Chameleon connections.
- Connect chiller hoses, same as Chameleon connections, COOLING IN (head) to out (chiller), and COOLING OUT (head) to in (chiller). Double-check the orientation, this is very important !!!!
- Ensure that the appropriate Service and Customer software is installed before connecting the laser USB communications cable to a suitable PC.
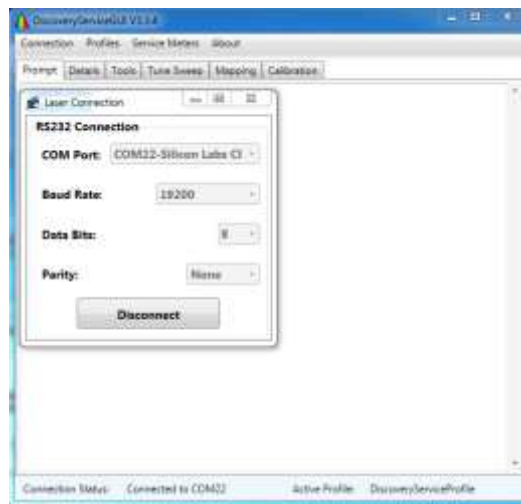
8.0   POWER ON

8.1   INITIALISE

- Ensure that all connections are securely made. Power on the MRU, chiller, and PSU.
- At mains switch-on the fault LED on the PSU will flash as the laser modules initialise. This will continue for around 10 minutes until the laser is ready to key-on.

8.2   SERVICE GUI

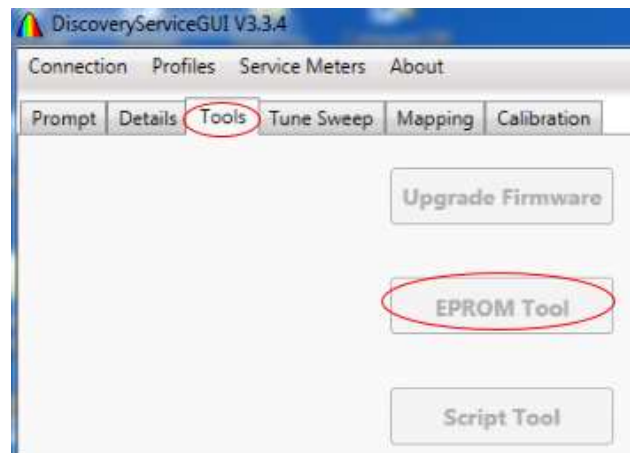- Open the Service GUI and establish communications via the 'Connection' menu.

- From the 'Prompt' tab, send the commands ?ST and ?F, and ensure that the laser is in Standby and that no faults are present.
- Access service mode; send access=service, then password: clg5182
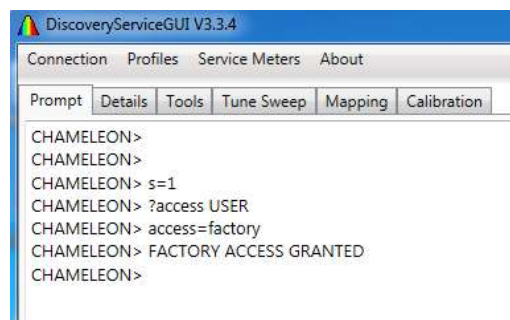
8.3   EEPROM TOOL

- Open the 'Tools' tab to select the EEPROM tool

- Wait for the system values to load, and save initial EEPROM to a suitable file location. This only needs to be done once, all EEPROM data will save for all fields in the one header tab.
- Any system calibration changes will necessitate a fresh EEPROM save similar to all Chameleon family.

- Key on. The laser will take a few minutes to fully turn on.
- Tune the laser to 680nm.
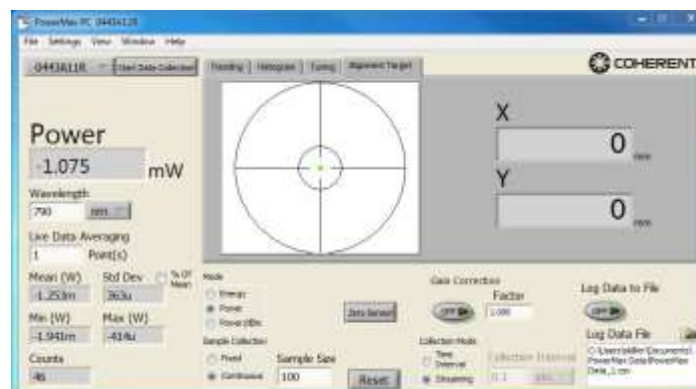
8.4   APE WAVESCAN

- When ready and it is safe to do so, open the tuneable shutter (s=1, or svar=1).
- Make sure the Wavescan software has the TCP Autostart box checked and TCP/IP port 51123. Press 'Start'. It may take some moments for the display to register a signal. Check/uncheck 'Autoscale Y' – make sure it is checked when aligning.
- Pick off a small portion of the tuneable beam and align into the Wavescan head, using the pinhole guides for initial alignment. Once a peak can be seen amidst the noise, fine-tune alignment for strongest signal (>40000 at 680nm).
- Make sure the signal is not saturated or peak detection may be difficult to determine. The Wavescan signal saturates at around 60,000.

- Now tune to 1300nm and make sure the Wavescan registers and measures wavelength and bandwidth at the longest WL.

8.5   PowerMaxUSB

- Connect the power meter as usual and make sure it is recognised by the PC. Now close the software.

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8.6 CONNECT MEASUREMENT DEVICES WITHIN SERVICE GUI

- To connect the spectrometer and power meter in the Service GUI, the software needs to be set up in a specific order:
    o Make sure both meters are talking to your PC (see previous sections).
    o Close the Service GUI, close the Wavescan software, and close the PowerMax software.
    o First, re-open the Wavescan software. Make sure the Wavescan software has the TCP Autostart box checked and TCP/IP port 51123. Press 'Start'. It may take some moments for the display to register a signal. Check/uncheck 'Autoscale Y'.
    o Do <u>not</u> re-open the Powermax software.
    o Now open the Service GUI.
    o Connect the PowerMax power meter and Wavescan using the 'Service Meters' menu (see below).
- Note that the Service GUI closes the shutter when re-connected so make sure to re-open before starting any of the optimisation procedures.
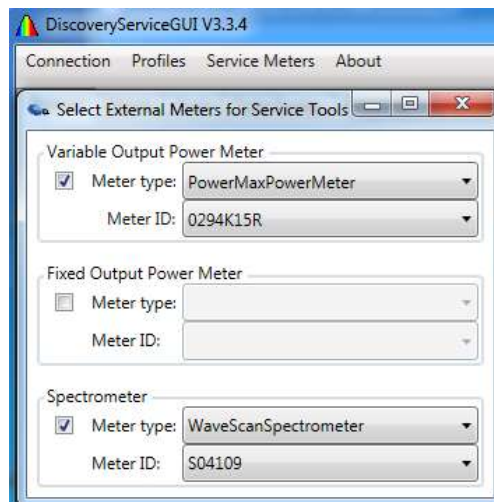

- If the meters are not recognised, it may be necessary to close/re-open the GUI again. Make sure the Wavescan software is running and connected, and that the PowerMax software is closed, before re-opening the Service GUI.

8.7   DATA RUN

First, carry out a datarun. This will determine if the subsequent calibrations need to be performed.
- Ensure the power meter and Wavescan are connected ('Service Meters').
- Tune the laser to 680nm and open the Tuneable shutter.
- Go to the 'Tune Sweep' tab and select a desktop location to save your file.
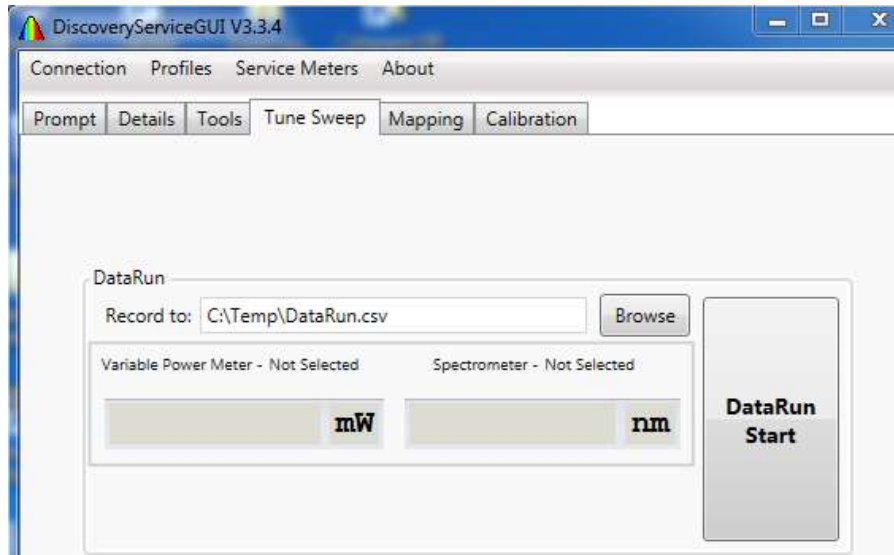

- At the start of the datarun you will be prompted to enter serial number details of the MRU, PSU, chiller and the measured Fixed (IR) output power, so make sure to have all of this info in advance.
- The procedure will take around 30 minutes to complete, it runs from the shortest to longest wavelength in 10nm steps and records power measured on the power meter and wavelength accuracy on the Wavescan spectrometer.   Once complete review the data, checking power and wavelength accuracy against the datasheet specification.   Wavelength accuracy should be within ± 5nm.
- At this point assuming specification is achieved and confirmed, the installation is complete.
- If calibration is required, continue onward from section 8.9.
- Return the laser to customer mode (access=0) and begin customer GUI and regular maintenance training (CoolFlow 6 month replacement cycle and MRU cartridge inspection & replacement).

8.8   PUMP MAP ROUTINE

- Record pump mirror starting positions for Px & Py
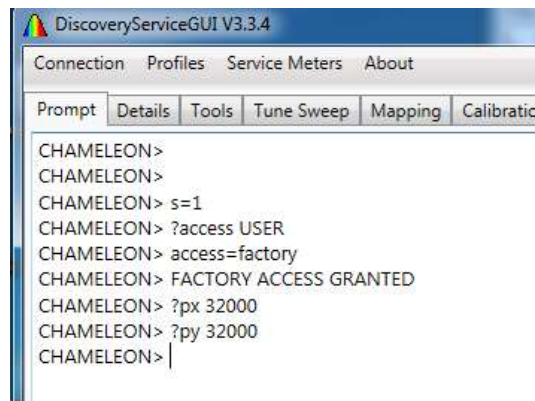
- In the 'Mapping' tab;
  - Set the wavelength to 1000nm.
  - Set the Step size at 8000.
  - Browse to a desktop location to save your map, and make sure the power meter is registering before starting the procedure.
  - Begin the procedure by clicking the Start button.
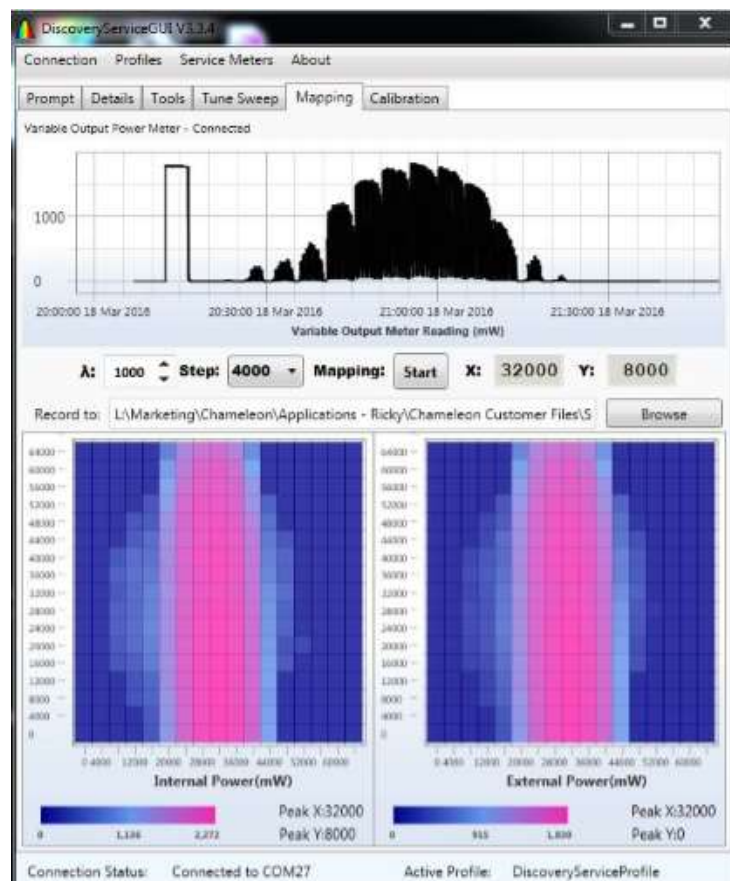
- The pump map will complete and move Px & Py to their current optimal positions at the end of the procedure.

8.9   WAVELENGTH CALIBRATION

In the event the wavelength accuracy is inconsistent >± 5nm, a wavelength calibration should be performed. Wavescan should still be connected and software running.

Using the 'Prompt' tab:
- Send tmin=650 and tmax=1350 to widen the tuning range and tune to 655nm.
- Use the ?stp1pos command to find the actual stepper position. Record this value.
- Use the command plock=0, to switch off power lock.
- Send the command stp1pos=XXXXX in 50-100 steps up or down to identify exact stepper location on the Wavescan for 655nm ± 1nm. Send the plock=1 command after each change to switch power lock back on.
- Make a note of the stepper value for 655nm ± 1nm.

Go to 'Calibration' tab
- Store the actual stepper value for 655nm into the Start Position (@655nm) box to the nearest 50 steps.
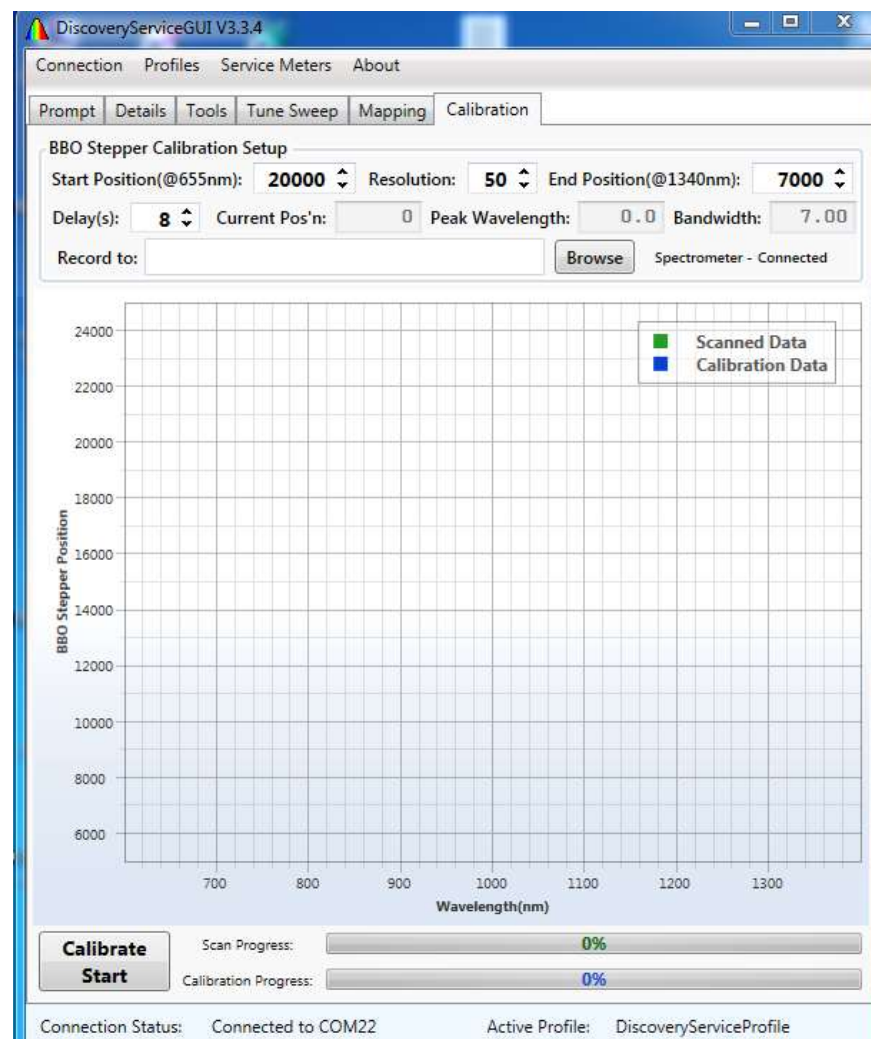
- Go back to the 'Prompt' tab, tune to 1340nm and repeat above procedure exactly to find the stepper position for 1340nm ± 1nm. Enter the 1340nm position in the End Position (@1340nm) box.
- Tune the laser back to 655nm and set the stepper position (stp1pos=X) again to the correct stepper position for 655nm ± 1nm. The wavelength calibration must begin at 655nm. Browse to a desktop location to store the file. Begin the procedure via the Calibrate Start button.
- The procedure will take approximately 2hrs to run as it steps in 1nm increments, checking and adjusting the stepper position for accuracy from 655nm to 1340nm.
- The Scan Progress bar will display progress in motion. The Calibration Progress bar will update the EEPROM with the new stepper calibration positions at the end as shown in the graph created.
- At the end of the procedure the tuning min & max should automatically revert back to 680nm / 1300nm, send the ?tmin / ?tmax commands to confirm.
- Run the DATA RUN program again to confirm calibration accuracy across the full tuning range.

8.10 PHOTODIODE CALIBRATION

- If required, to adjust the photodiode to match the power meter value, the commands are:
- Tunable: P4cal=xxxx
- Fixed: P1cal=xxxx
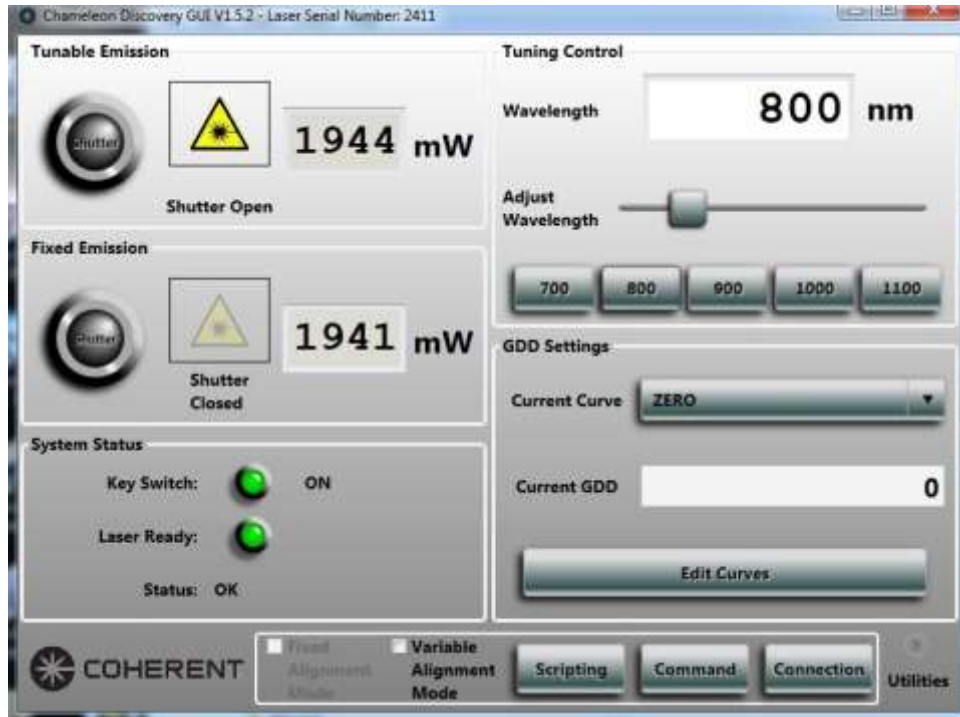- where xxxx is the external power in milliwatts.

Alternatively, the software has an automated routine.
- Enter the min/max wavelengths and press 'Start' to begin the procedure.
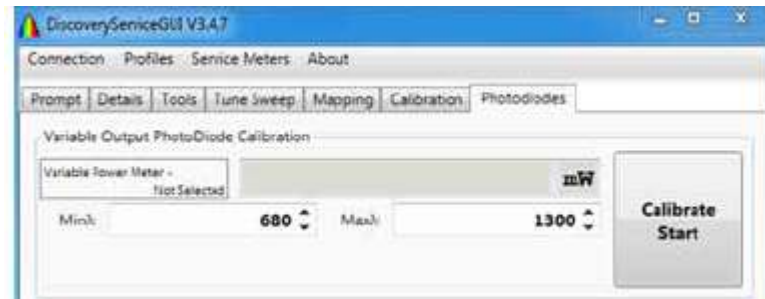
9.0   COMPLETE INSTALLATION

- If wavelength or PD calibration was required, save a final EEPROM copy (ref: section 8.4)
- Return laser to customer mode with the access=0 command.
- Prior to the installation, please refer to the GUI Operator's manual to familiarise yourself with the user controls.
- Open the customer GUI and demonstrate the connection and control options.

10.0 INSTALLATION CHECKLIST

Task	Check?
Unpack – check condition of received items	
Connections - Umbilicals (x2) - Coolant hoses (x2) – check orientation!!! - MRU hoses (x2) – check orientation!!! - Interlock cables MRU and PSU - Serial connection to PC	
Power on - Verify chiller setpoint 20ºC - Fault light flashes ~10minutes	
Commence install - Open Wavescan software, configure, and align - Connect PowerMax (do not open software). - Open Service GUI and connect service meters - Save initial eprom file - Run initial datarun	
Analyse datrun results – calibrations required? - Run calibrations (full/partial) as required	
Complete install - Run final datarun - Save final eprom - Close Service GUI - Install user GUI on customer PC and demonstrate	

11.0 DEFINITIONS

REF:	DEFINITION