Tasks Completed:

1. Operational testing of the laser diode: The operation of the laser diode was verified by providing injection current to the laser diode in the butterfly laser package and the intensity of the infra red light outputted through the fiber optic cable was measured using an optical power meter.

2. Internal wiring of the laser module mount.
The LDM-4980 Laser diode mount is equipped with configurable pin headers which allow the mount to be configured for any appropriate laser diode pin-out. Two 9-pin D connectors in the mount are used for laser current control and laser internal temperature control. The mount was configured for our laser diode by connecting the colour coded wires from the 9-pin connector to the corresponding pin on the configurable header. Connections to the laser module can now easily be made through the two 9-pin D connectors.

3. TEC controller and Laser Current driver connections
Computer monitor cables with 9-pin connectors were used to provide the interface between the mount and the TEC Controller and Laser Current driver. The 9-pin D-SUB male connector on the mount was connected to the TEC controller while the 9-pin D-SUB female connector was connected to the constant current driver. (The schematics of the pin configurations and wiring will be provided in the final report.)

4. Operational testing of the constant current driver
The constant current driver operates within a voltage range of -8 to -12 V. Both internal current control (using a 12-turn on board potentiometer) and external current control (using 0 to 5V Analog Input voltage) were tested and used to supply input current ranging from 0.55mA to about 100mA. The corresponding output power from the laser was measured using an optical power meter and a maximum output power of around 2mW was measured. (The accurate power versus input current characteristic of the laser will be provided in the final report)

5. Operational testing of the TEC controller
The TEC controller is used to maintain a constant temperature on the device mounted to the cooler based on feedback provided from a 10kΩ NTC type thermistor sensor. The temperature control range is from 5kΩ to 25kΩ (approximately 40°C to 10°C). The TEC controller was tested by setting the desired temperature using an onboard potentiometer and measuring the actual temperature of the module from the value of the resistance of the NTC thermistor. The resistance of the thermistor was determined by measuring the voltage across the appropriate output pins and using the conversion factor given (1.000V = 10.000kΩ).
Outstanding Tasks:
1. All Programming of DSPic Microcontroller
   The controller will be responsible for setting the required temperature and input
current on the TEC controller and current driver respectively for a desired intensity
(power output) and operating frequency of the laser.
   A possible addition to the control system could be to control the output of two laser
modules in order to maintain a precise difference in the operating frequencies of the
two lasers.

2. Testing of laser controller
   Some hardware testing has been completed. The complete system including DSPic
Microcontroller has yet to be tested. Possible testing procedures may include:
verification of output frequency, verification of output line-width, graphical plots of
applied inputs and corresponding laser output, etc.

3. Poster Presentation, Website, and Final Report

**Hardware not yet acquired:**
1. The microprocessor chip for damaged board has not yet arrived. (DSPic
   Microcontroller)
2. D/A converter
3. A digital potentiometer is required to replace the potentiometer of the TEC
   in order to implement the control system.