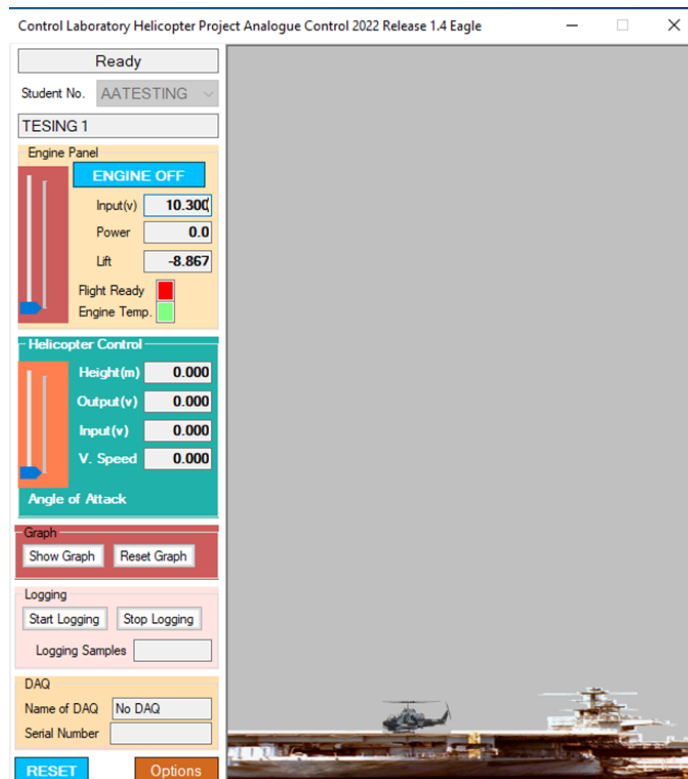


# User Manual

## Control Laboratory Altitude Simulator

Release 1.4

12-Sep-23



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## 1. Description

The Control Laboratory Altitude Simulator simulates altitude control of a helicopter. The simulator uses an image of a helicopter to simulate the altitude of a helicopter in meters. The altitude of the helicopter is controlled by an input voltage. An output voltage indicates the current height of the helicopter in volts. This is achieved with a Control Laboratory Data Acquisition Unit connected to the PC. The purpose of the simulator is to control the altitude of the helicopter by using an electronic circuit connected to the Data Acquisition Unit (DAQ) as shown in Figure 1.



Figure 1: Control Laboratory Data Acquisition Unit

## 2. Student Sign On

The generated functions are unique to the student numbers. Hence students need to sign on before doing any testing. Once you have started the software by clicking on the icon do the following.

Select your student number.

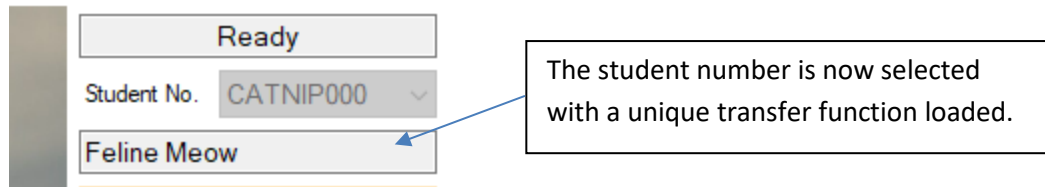
Student No.

Click on drop down box.

Select your student number.

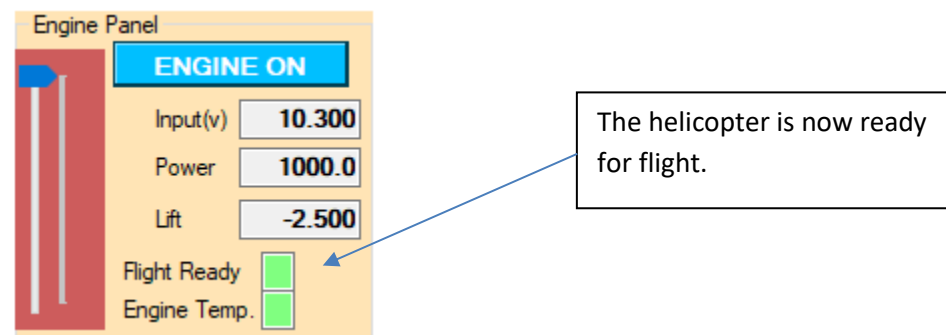
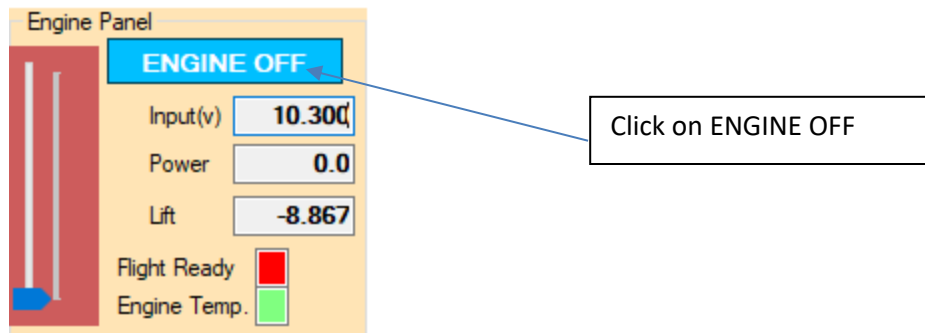
Student No.

Select your student number.

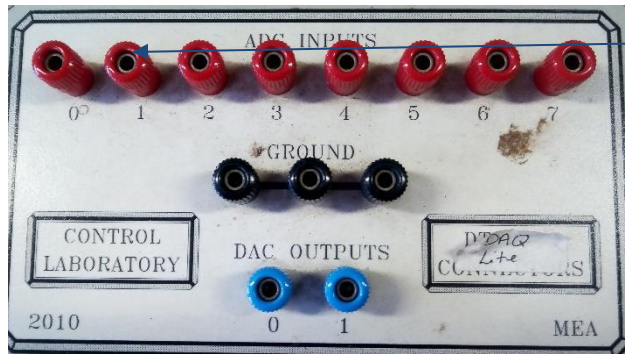


### 3. Start Engine

To start the helicopter engine, simply click on the ENGINE OFF button.



#### 4. Angle of Attack



Applying a voltage to ADC INPUTS 1 on the DAQ causing a change in the angle of attack of the rotor blades as shown in Figure 2. This causes an increase or decrease in lift consequently making the helicopter go up or down. The operating voltage of the angle of attack is from 0 vdc to 5 vdc. Figure 3 shows the connections to the DAQ.

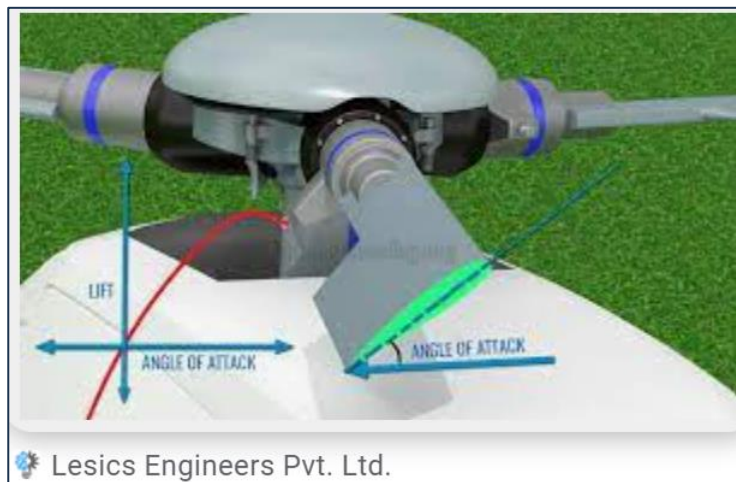


Figure 2: Angle of attack of the rotor blades

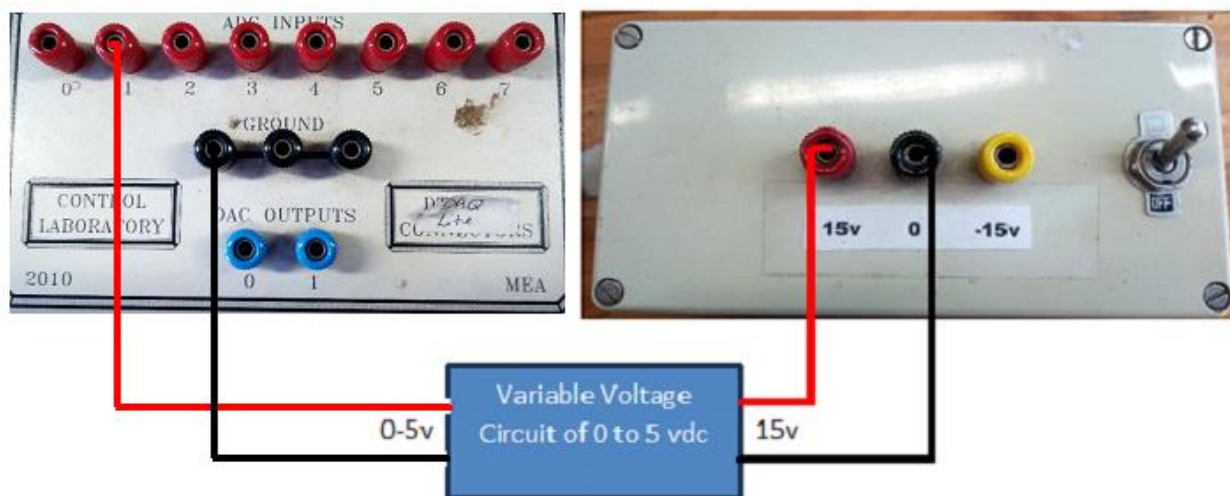
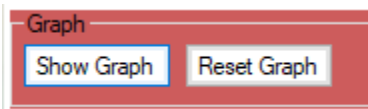


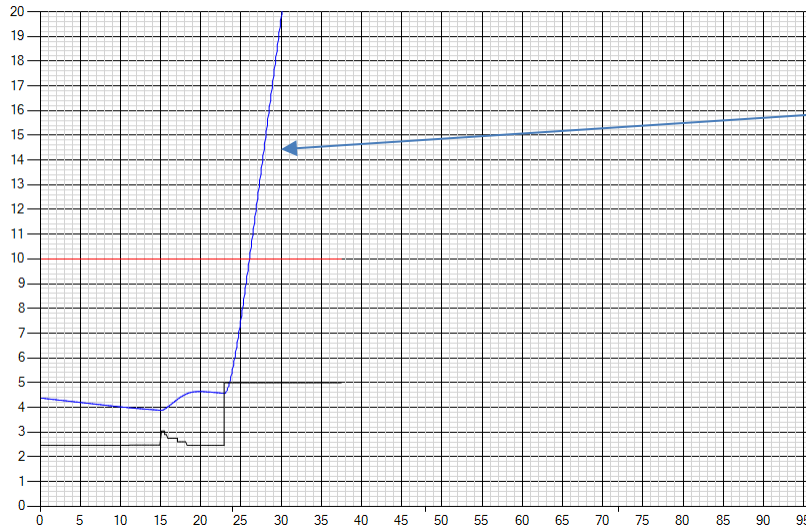
Figure 3: Connecting to the input voltage to control angle of attack of the rotor blades.

## 5. Show Graph and Reset Graph



Click on Show Graph to view the testing graphically. Reset Graph is to start the graph plotting from zero.

Graph Unit



Graph showing the response of a step test.

## 6. Logging Data

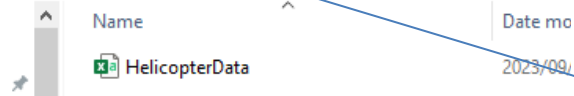
Logging

Start Logging Stop Logging

Logging Samples

Start logging records the response.  
Stop logging stops the logging.

This PC > Local Disk (C:) > HelicopterData



The data is saved in the folder name HelicopterData and a file name of HelicopterData. The file format is in CSV.

Time(s)	Input(v)	Output(v)	Output(m)
73.4	0	0	0
73.5	0	0	0
73.6	0	0	0
73.7	1.304	0	0
73.8	5	0	0
73.9	5	0	0
74	5	0.043	0.045
74.1	5	0.129	0.134
74.2	5	0.256	0.267
74.3	5	0.426	0.444
74.4	5	0.637	0.663
74.5	5	0.888	0.925
74.6	5	1.18	1.229
74.7	5	1.512	1.575
74.8	5	1.883	1.961
74.9	5	2.293	2.389
75	5	2.742	2.856
75.1	5	3.229	3.363
75.2	5	3.754	3.91
75.3	5	4.316	4.496
75.4	5	4.915	5.12
75.5	5	5.551	5.782
75.6	5	6.223	6.482
75.7	5	6.93	7.219
75.8	5	7.674	7.993
75.9	5	8.452	8.804
76	5	9.264	9.65
76.1	5	10.111	10.533
76.2	5	10.992	11.45
76.3	5	11.907	12.403
76.4	5	12.854	13.39
76.5	5	13.835	14.411

Data is logged at a sample time of 100ms. The Input(v), Output(v) and Output(m) are logged.