EXERCISE 1B
Measurement and calculations of theantenna temperature T_A and the receiver temperature T_R.

Theoretical basis:
The noise power measured at the output of the antenna- radiometer is proportional to the noise power at the entry to this system:

$$W_{1,wyj} = k(T_A+T_R)\times G+x$$

where G is the system amplification, W – the reading from the AC converter, x – an independent scale shift. If we add to the noise power produced in the antenna the known noise power from the noise generator, Tcal=8670 K, then the power at the output

$$W_{2,wyj} = k(T_A+T_R+T_{cal})\times G+x$$

Measurements:

1. Measure the power at the output of the receiver for the antenna pointed to the zenith, with the noise calibrator subsequently switched on and off. Set the same time constant like in the Exercise 1a.
2. Register the signal during movement of the antenna from Zenith to the horizon. Measure the noise fluctuations of the radiometer T_{sys} and calibration. We will get the following formula for the Zenith and the horizon:

$$W_{H,wyj} = k(T_H+T_R)\times G+x$$

$$W_{Z,wyj} = k(T_Z+T_R)\times G+x$$

In a similar way you can obtain equations for cases with the noise generator switched on.

Report (coverage):

1) Setting the temperature at the horizon T_H= 290 K and taking into account the measurements from point 2 obtain the temperature of the receiver.
2) Using the equation above calculate the temperature at Zenith T_Z and coefficients G and x.
3) Present the figure of the temperature changes of the sky across the altitude above the horizon.