NELIS Natural Environment Light Intensity Simulation System

System Description

The NELIS system is designed to emulate sunlight and moonlight as close to nature as possible. It consists of various modules, allowing optimum configuration variations depending on the desired setting.

ORBIT calculates sun and moons actual heights above horizon for any given position on earth's surface between 65°N and 65°S in realtime. Further on ORBIT calculates the actual moon phase and the part of visible moon disk. This is the base for calculating the actual relative light intensities for sun and moon, which are offered on the *„SUN“* and *„MOON“* outputs as 0-10V Signals and used to control other devices. An additional ON-OFF-Signal can be used to control non-dimmable devices.

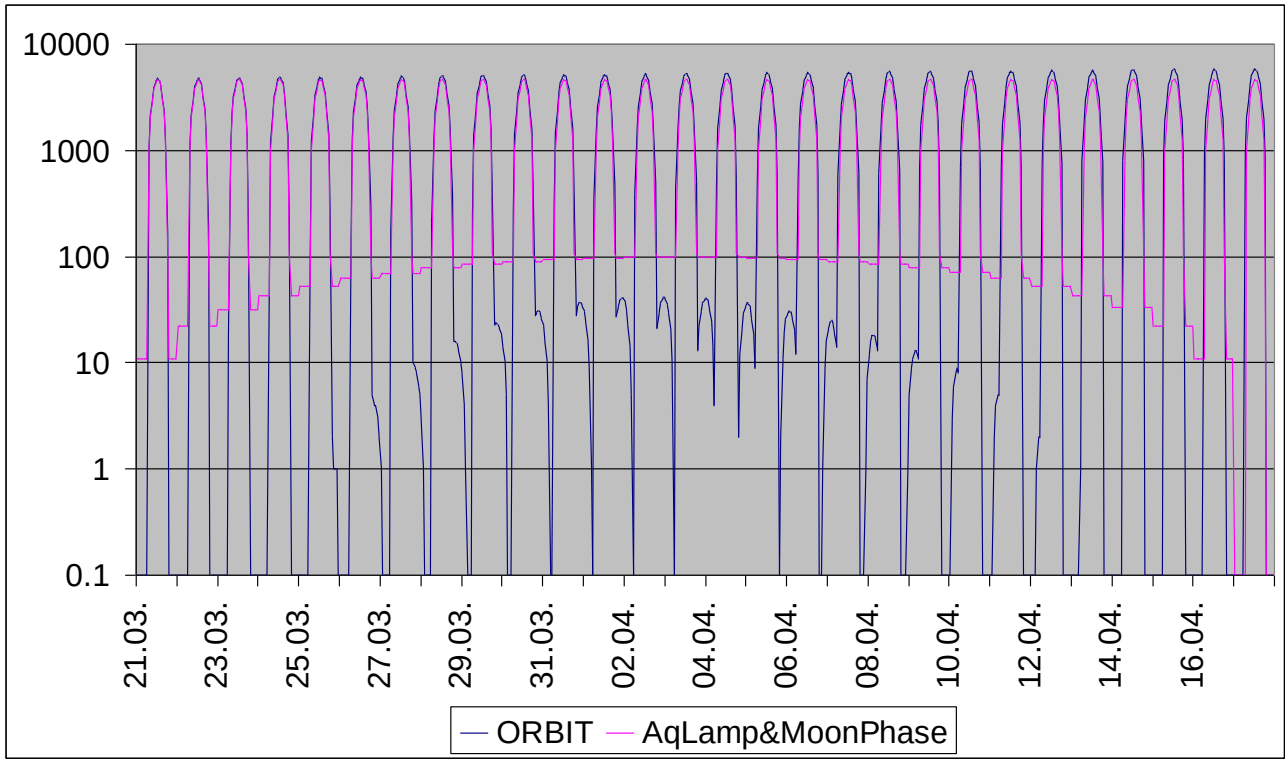

Fig. 1: A comparison between suns and moons real light intensities during one month, calculated by NELIS ORBIT, and a combination of artificial day light (sinusoidal light intensity curve programmed) and a moonlight with light intensities based on a 28-day moon phase period, switching on if daylight drops to a intensity less than 1%. The values of the Y-axis (light intensity) are scaled logarithmically for a better readability of the lowlight ranges. Exept of two days (new moon),with the combination of daylight and common moonlight there is always some light emitted to the tank. ORBITs calculations result in times of complete darkness. On rising moon phase the darkness appears to the end of the nights, on descending moon phase to the beginning of the nights.

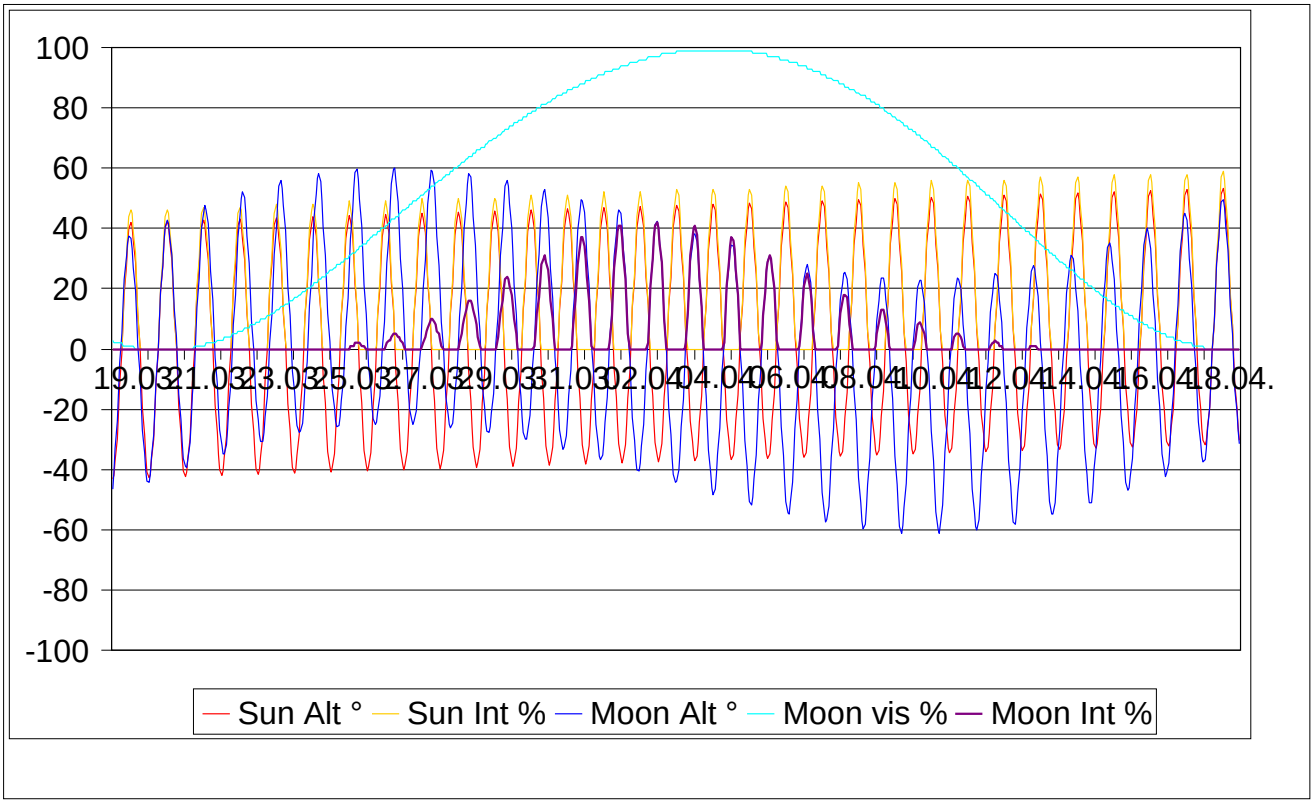

Fig. 2: Data calculated by ORBIT for 47.56° N / 7.59° E, 19.03.2015 – 18.04.2015. Alt means altitude, Int means intensity, vis means visibility.

ML-2M und ML-8M are light modules emitting the spectrum of visible light of moonlight under water, on 2m depth or 8m depth. They can be placed over one or more fish tanks. The light modules are not PWM controlled, the brightness is adjusted by voltage regulation. This allows continuous light emitting, no fast flashing dimming. The resolution is over 1000 steps.

LIN7x1A is a regulated constant current source with adjustable current output from 0 to 1.2 A for seven channels. It was designed to drive LEDs flicker free. Te desired maximal current can be adjusted for each channel separately by a potentiometer. Another potentiometer allows the minimal current per channel. The seven channels are divided in two groups: group A with 5 channels and group B with 2 channels. Control voltage inputs (0 - 10 V) for the two groups allow to reduce the output current, allowing do dim the driven LEDs infinitely variable.

2GHL is an adapter module, which provides the output from ORBIT control signals on a Western socket like the GHL Profilux. Thus GHL-compatible devices can be used as lighting devices.

HCPWM can be looped into the power supply cable of LED lights and offers the possibility to dim them according to the brightness levels calculated by ORBIT (PWM, 10bit @ 15.6 kHz).

2xFL used to switch and dim 1-2 fluorescent tubes.

2xSW switching on or off of non-dimmable devices, depending on whether the sun / moon is above or below the horizon.