

Heads-Up Display User's Manual

Notice: While you can still see through the LCD screen during operation, you should not use the Heads-Up Display while driving or operating machinery. The creators of this product shall not be held liable for any injury, death, or damage resulting from any use of this project, even if they have been advised of the possibility of said damage in advance.

Operation:

The Heads-Up Display can be powered by a 9V battery, a compatible wall-wart adapter, or from 5V USB power. The 9V battery or wall-wart adapter plugs in to the 5mm center-positive barrel jack found on the Arduino Mega 1280 board (the large blue circuit board). The USB B jack is also found on the Mega. Pictures of these jacks can be found in **Figure 1**.



Figure 1: A) The 5mm barrel jack; B) The USB B female jack; C) The reset button.

Upon powering the device, the Heads-Up Display will begin operation. It is good practice to immediately press the reset button (also found on the Mega, and shown in **Figure 1**.) after powering up the device. After one minute of operation, if the Heads-Up Display screen continues to show zeroes for the latitude, longitude, and/or time, you are either several hundred miles off of the southern coast of Ghana at precisely 6:00am local time (the Heads-Up Display is set to show time in the Central United States time zone, UTC-06:00) or the GPS module is not receiving an accurate position fix. See the troubleshooting section for information on obtaining a GPS fix.

Wearing the Heads-Up Display

To ensure correct operation, the Heads-Up Display should only be worn as one properly wears hats, with the brim to the front. Testing has shown that skewing the brim sideways or backwards results in diminished functionality of the device and has caused injury in animal test subjects.

Troubleshooting

Press reset. Wait 1 second. Press reset again. Rinse. Wash. Reset. Repeat.

If you are having trouble obtaining a GPS fix, ensure that the GPS antenna is properly screwed into the Venus GPS chip and that the ceramic portion of the antenna is facing towards the sky (see **Figure 2**). The



Figure 2: Correct placement of the GPS antenna.

GPS antenna may not be able to receive a position fix while in covered structures, Faraday cages, or indoors, so outdoor use with unobstructed sky views is advised.

Sadly, the Heads-Up Display will not function without a power source. If nothing is displaying on the screen, you may not have supplied an adequate source of power. USB power or 6-12V power from a battery or wall-wart adapter can serve to power the Heads-Up Display.

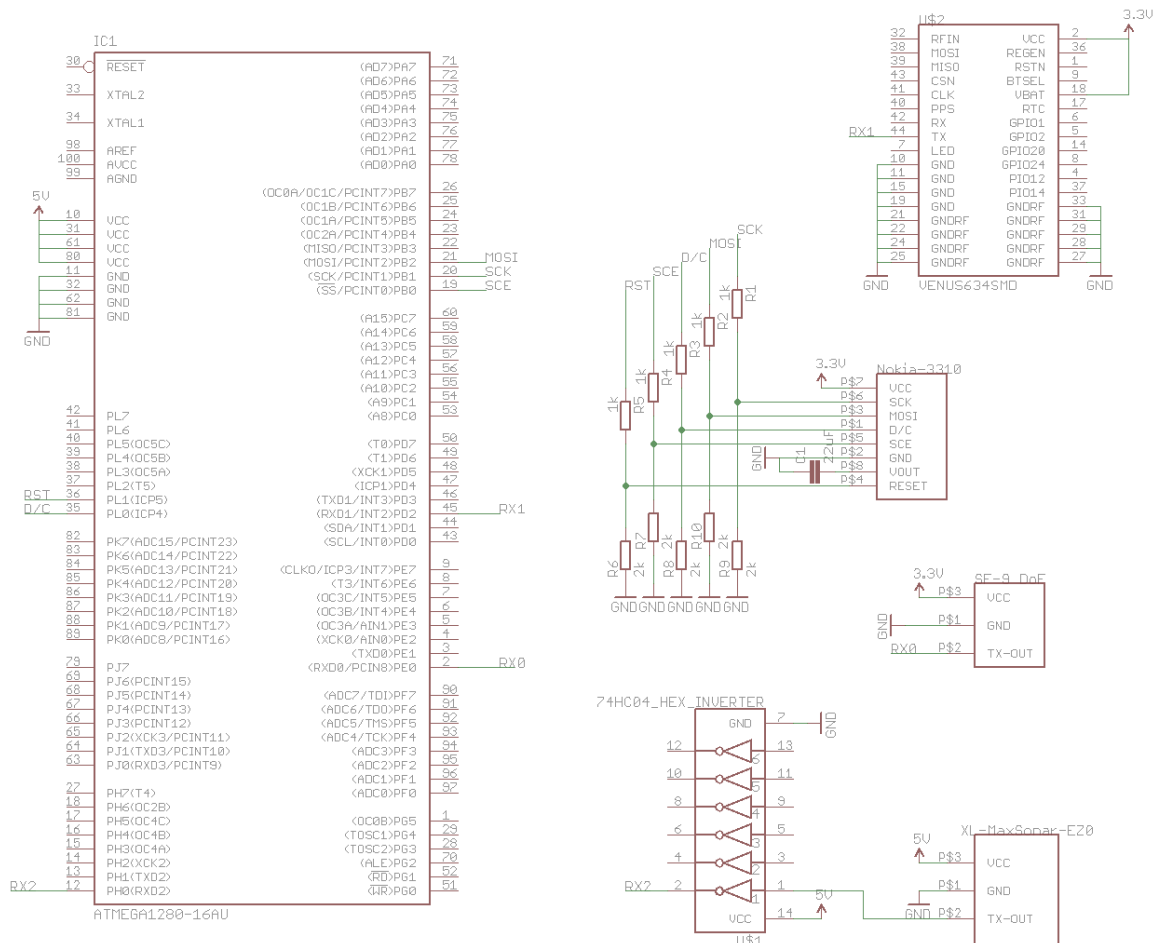


Figure 3: Device schematic for Heads-Up Display

If a wire becomes detached during operation, please refer to the device schematic shown as **Figure 3**, which has all of the connections between each component and to power and ground. Be careful to only reconnect devices where the diagram indicates, as voltage levels between the devices differ. If all of the connections on the Heads-Up Display are correct and it still is not functioning properly, one or more of the components may be borked (faulty). All of the major components (sensors, IC chip, and LCD) are connected to the base electronics board via header connectors, and thus can be removed and replaced with (identical) functioning parts. The Arduino Mega is attached to the electronics board via Velcro, and therefore is also removable.

Basic Device Layout

The basic layout of the Heads-Up Display is shown below in **Figure 4**. The device contains 3 sensors: an inertial measurement unit (IMU), a GPS unit, and an ultrasonic (sonar) sensor. The device is controlled by an Arduino Mega 1280, and displays data onto a Nokia 3310 LCD.

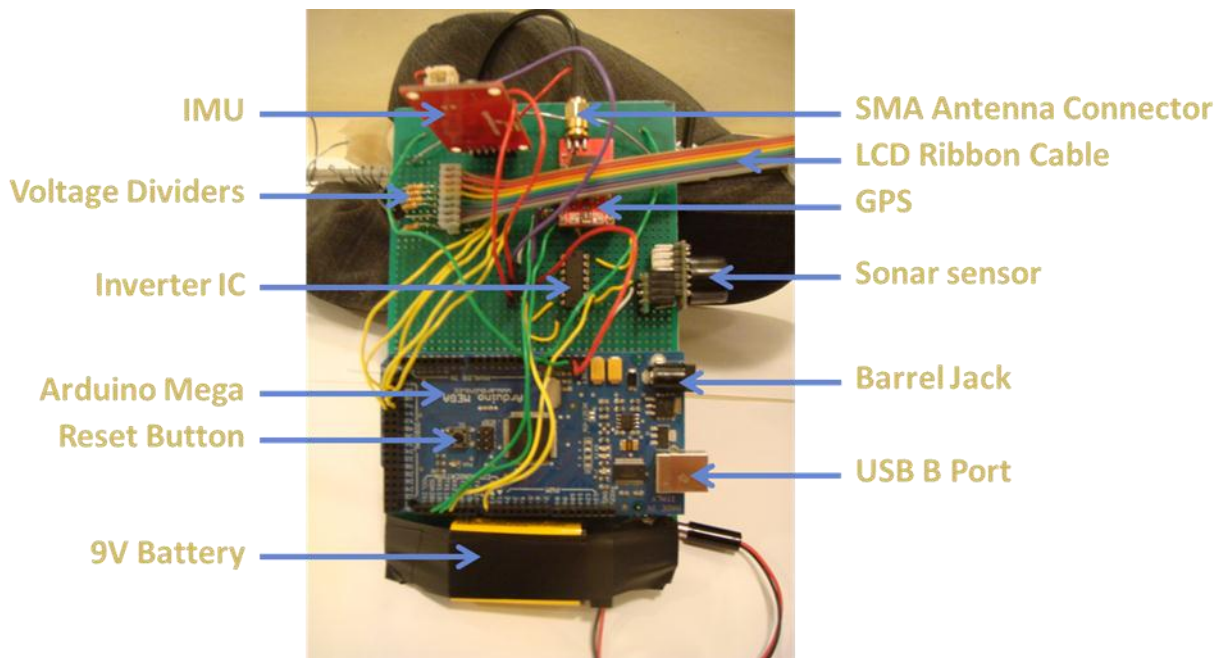


Figure 4: Side view of the Heads-Up Display's electronics board.