Setting up and Calibration of the Sensors on the IMS Dredge

By Ivan Izaak

The IMS Dredge is a small (16m in length overall) cutter suction dredge, which can be used for dredging operations in the restricted shallow areas, such as watercourses, channels etc.

FIGURE 1. *IMS Dredge, Yixing, China*

There are two sensors on the IMS Dredge: a dual antenna GPS HEMISPHERE, which is connected to a PC via serial port and a Unimeasure Pressure Sensor, connected to the computer via DGH A/D Card.

The setup and calibration procedure is quite simple.

COMMUNICATION

HEMISPHERE DUAL ANTENNA GPS

Dual antenna is installed typically on the top of the cabin. It comes with Pocket Max controlling software (you can also download it from the web-site: http://www.hemispheregps.com/Support/AgricultureProductSupport/OEM/Software/tabid/594/Default.aspx)

It is recommended to connect a GPS to serial port 3 with the baud rate of 19200 bits per second.

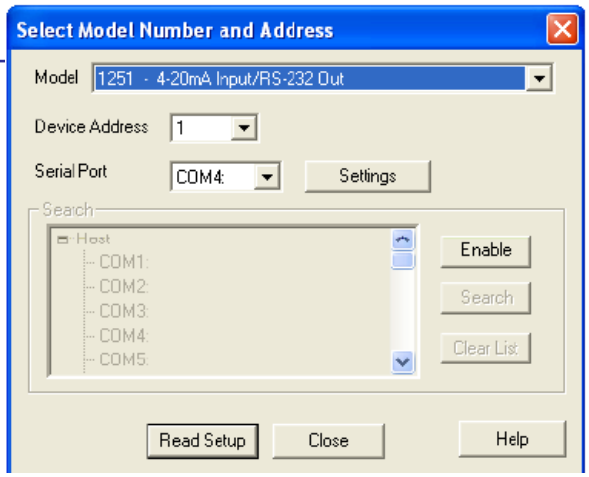
UNIMEASURE PRESSURE SENSOR

A DGH UTILITY program should be installed on the computer.

1. **Run DGH UTILITY program**.

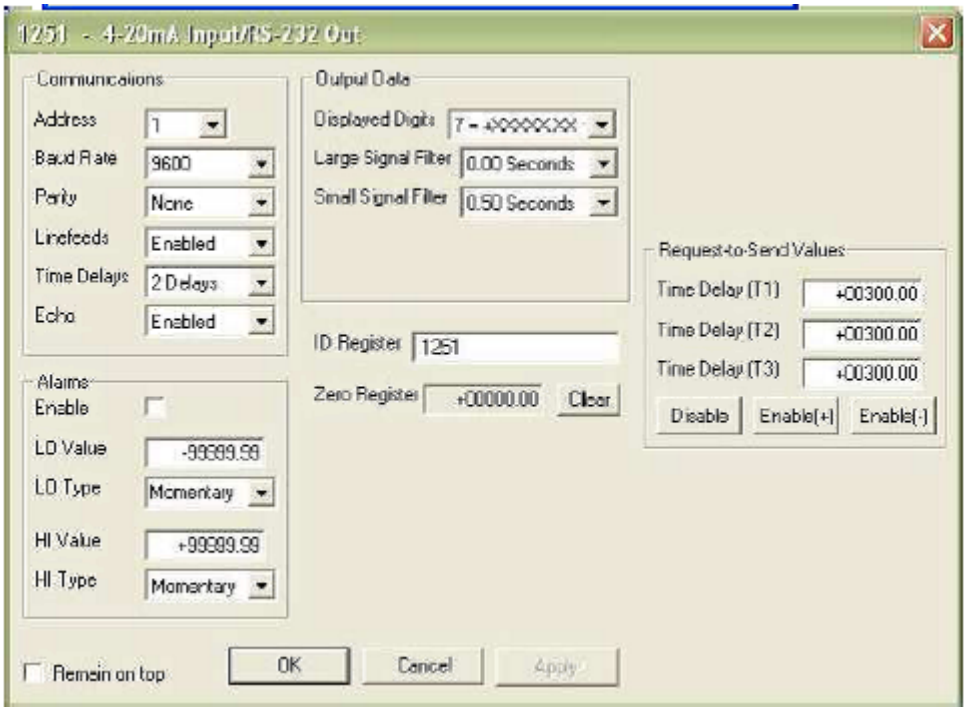
2. **Select SETUP–MODULES.** The Select Model Number and Address dialog will appear.

FIGURE 2. Select Model Number and Address Dialog



a. **Select "1251 – 4-20mA Input / RS 232 Out"** from the list of Models.
b. **Ensure that the Device Number is 1**.
c. **Select the correct serial port number** (it should usually be 4).
d. **Click [Settings]** and enter the following:
   - Baud Rate = 9600 bits per second,
   - Parity = None,
   - Flow Control = RTS Only,
   - Data Bits = 8
   - Stop Bit = 1
e. **Click the [Read Setup] button.** Set all the values as shown in Figure 3.

FIGURE 3. 1251 – 4-20mA Input / RS-232 Out Setup Dialog window

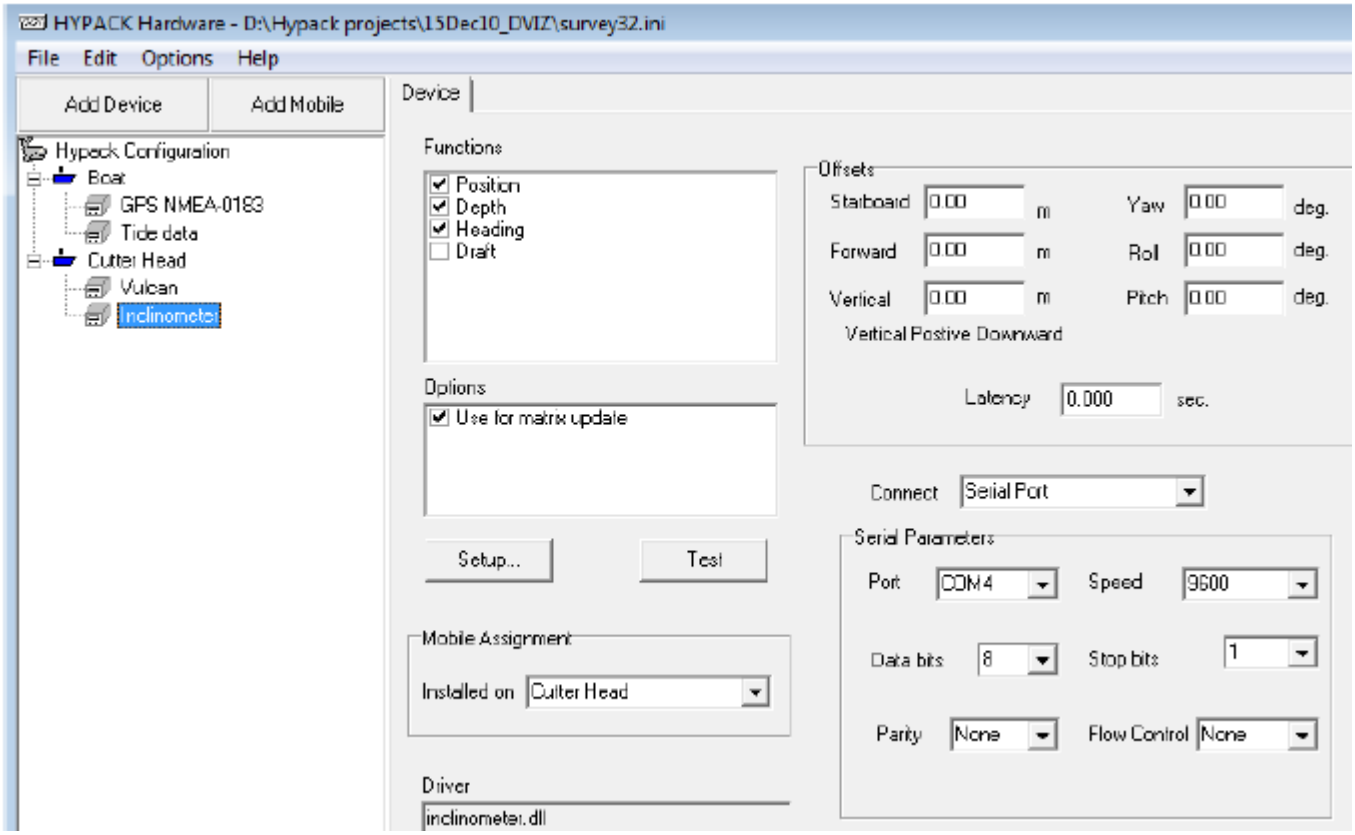


SETTING UP THE HARDWARE IN HYPACK® HARDWARE

1. **Before running HYPACK®, please copy the Inclinometer.dll from the Hypack_2011/Devices/Dredgepack folder into the Hypack_2011/Devices folder**.
2. **In HYPACK® HARDWARE do the following**:

- **Add the GPS.dll driver to the main boat** and set it as usual.
- **Add a new Mobile and call it "Cutter Head"**.
- **Add Inclinometer.dll**
  - **Enter the device settings as in Figure 4**.

FIGURE 4. *Device settings for Inclinometer.dll*



- **Click [SETUP] for the Inclinometer.dll and enter the driver settings** as in Figure 5.

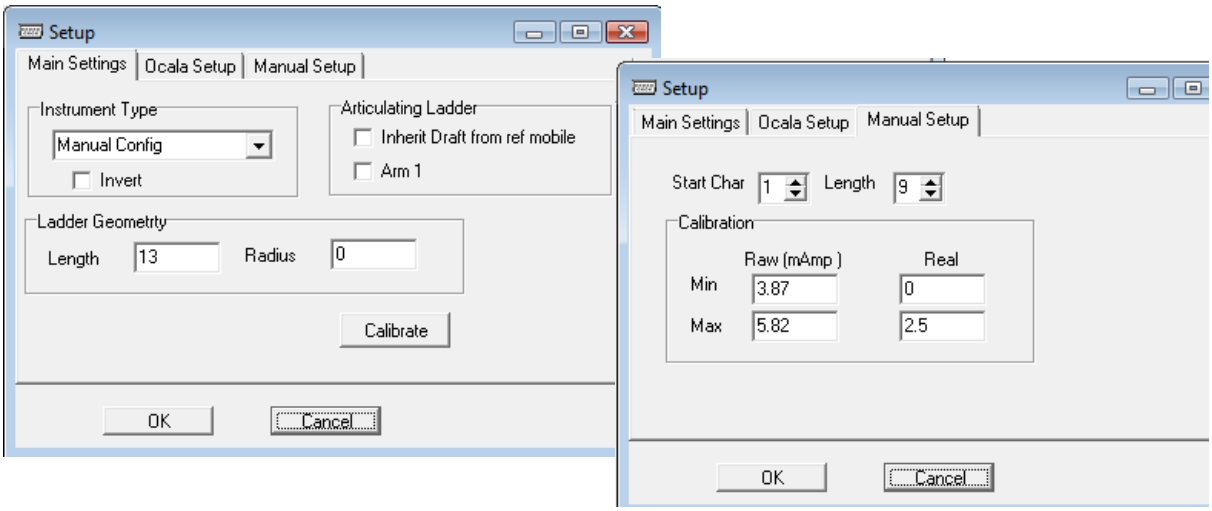
Main Settings tab:

- Under **Instrument Type** select "Manual Config".
- Input the **length of the ladder**.

Manual Setup tab

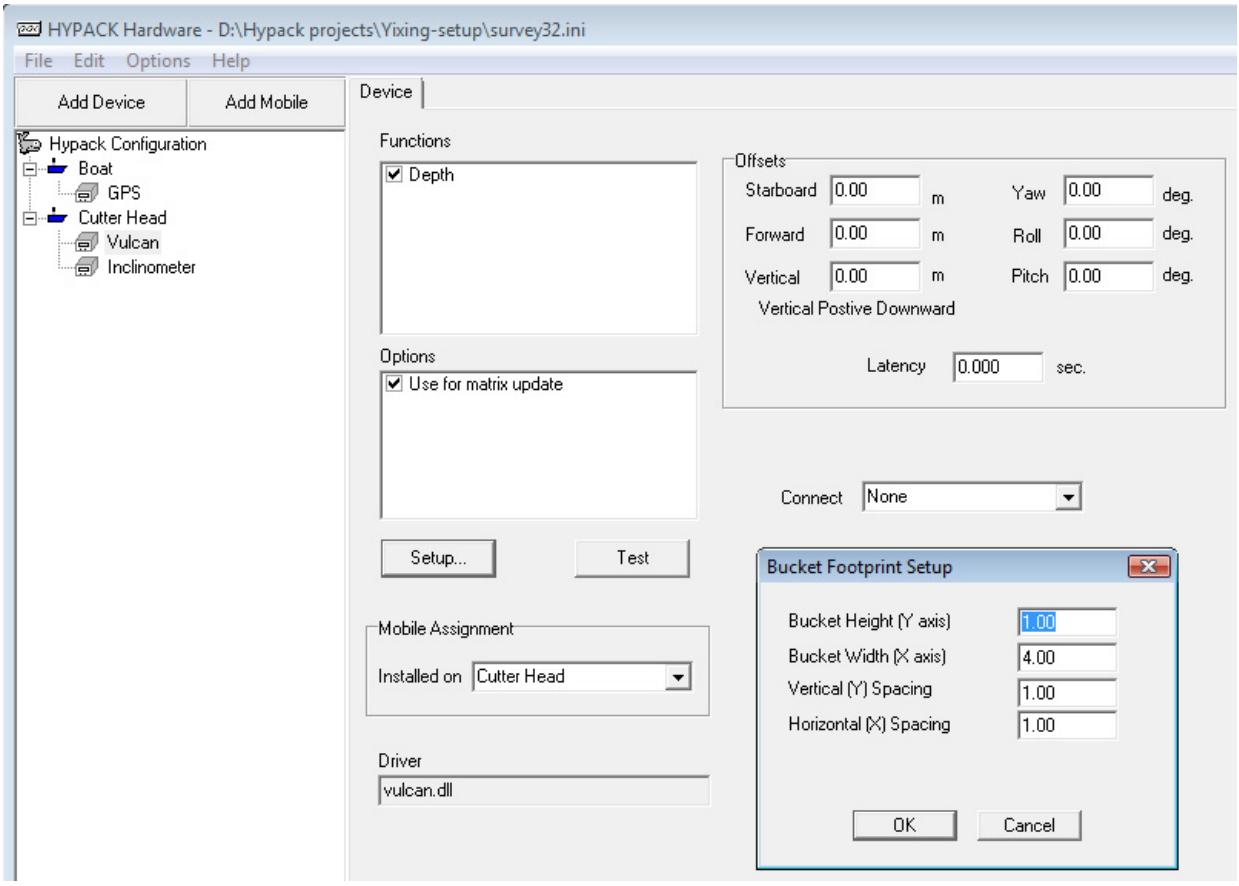
- Set the **Start Char** to 1 and the **Length** of the message to 9.
- Under Calibration, input **calibration values** (refer to CALIBRATION):
  - **Raw** – raw signal from Unimeasure sensor in mAmp,
  - **Real** – depth of the cutter head (in meters or in feet).

FIGURE 5. *Inclinometer Setup Dialog = Main Settings Tab (left), Manual Setup Tab (right)*



- **Add a vulcan.dll**
  - **Assign it to the second mobile**
  - **Set the cutter head length and width** with 1m/f resolution.

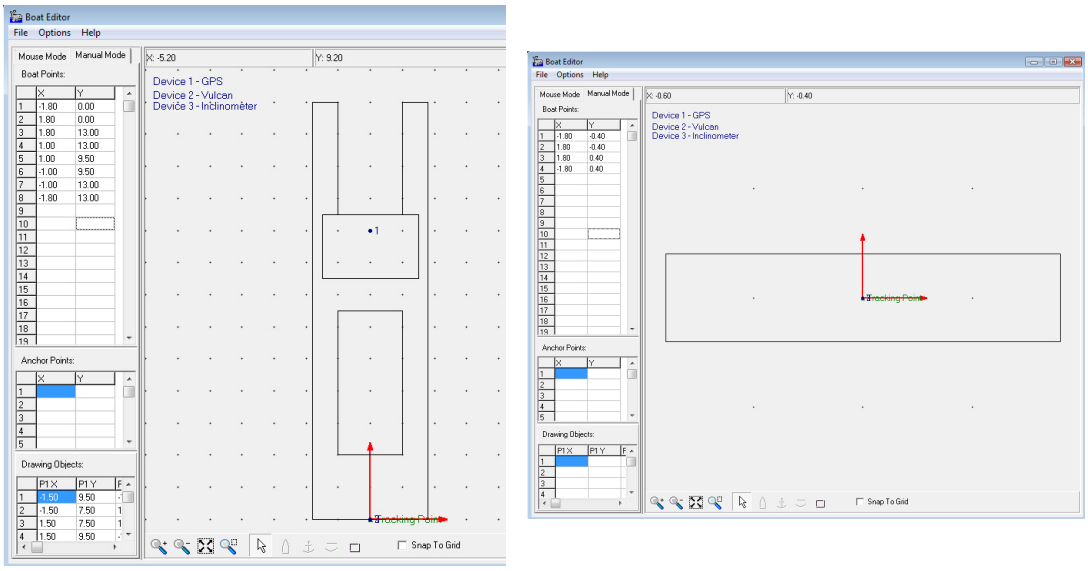
FIGURE 6. *Settings for Vulcan.dll*



For better visualization of the dredge and its cutter head, I've created two shapes in the BOAT SHAPE EDITOR and assigned them to the corresponding mobiles in HYPACK® HARDWARE.

Note: Please, keep in mind that we recommend that you use the trunnion as the reference point and measure the offsets of the sensors from this point.

FIGURE 7. *Shape of the IMS Dredge (left), Cutter Head (right)*



CALIBRATION OF THE UNIMEASURE PRESSURE SENSOR

In order to calibrate the pressure sensor, move the dredge to the deepest part of the dredging area.

1. **While in HYPACK® HARDWARE program, select the Inclinometer.dll and click [Test]**.
2. **Lower the cutter head to the water surface (Depth = 0) and note the raw signal** from the UNIMEASURE sensor. (You can see it under "Info" field in the TEST window.)
3. **Lower the cutter head to the maximum, measure the depth (we used a bar plate) and note the raw signal** from the sensor.
4. **Input the raw signal values** observed in steps 2 and 3 in the corresponding fields in the Manual tab of the Inclinometer driver setup.