



Hopper Dredges Instrumentation, Part 2 - Software Configuration

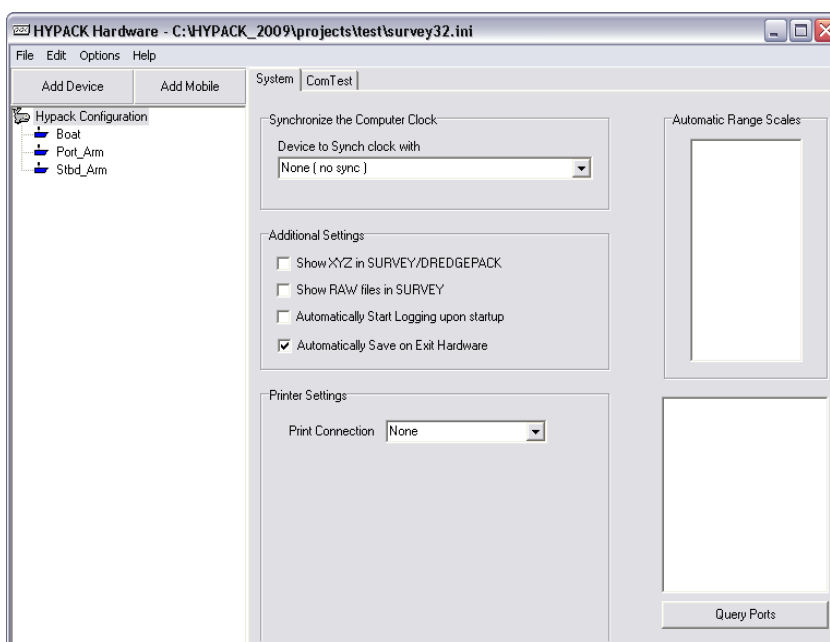
By Mircea Neacsu

A few months ago I started to describe the standard instrumentation for a hopper dredge. This month I'll continue with the software configuration.

ONE DREDGE, MULTIPLE MOBILES

In the HYPACK® HARDWARE program, we first need to add the different mobiles that will be used. For a dredge with one arm, we need two mobiles: the dredge itself (the default mobile) and the arm. For a dredge with two arms, we would need three mobiles: the dredge and two additional mobiles--one for each arm.

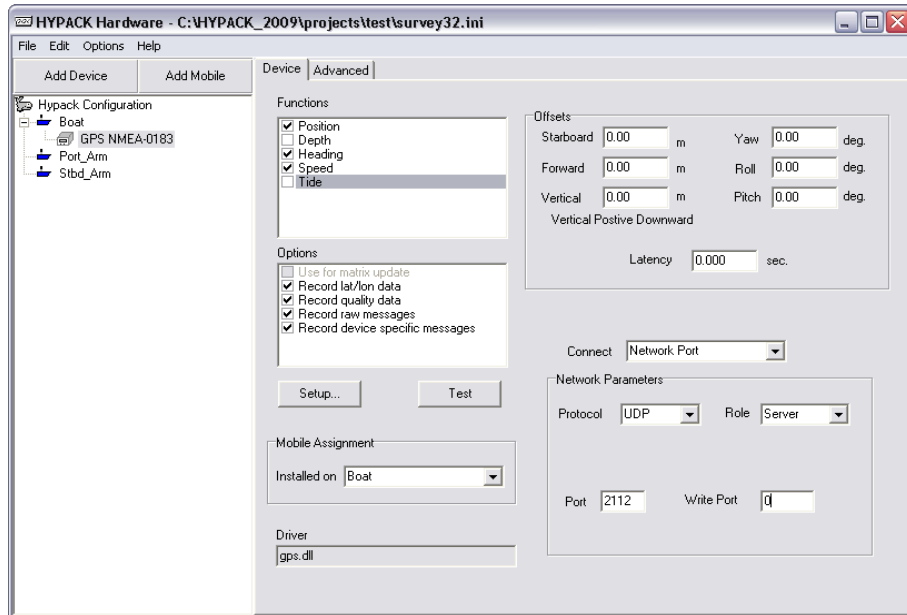
FIGURE 1. Adding Mobiles for a Hopper Dredge with Two Arms



CONFIGURING THE GPS RECEIVER

Starting with the simplest things, let us add the GPS driver and configure it to receive data over the network (the GPS is connected through an Ethernet to serial converter):

FIGURE 2.



The important parameters are:

- **Communication Protocol:** UDP
- **Function:** Server - that means the driver will receive data from any device that sends it on this port.
- **Read Port Number:** this is an arbitrary number but we have to remember to configure the same value in the serial to Ethernet converter.

We don't care about the write port because DREDGEAPCK is never going to send data to the GPS unit.

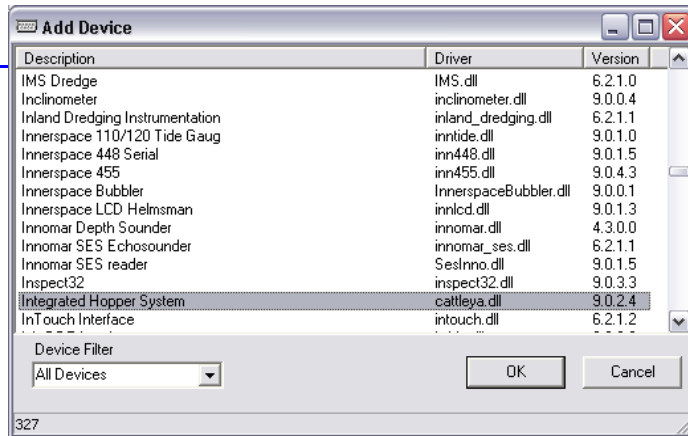
THE INTEGRATED HOPPER SYSTEM DRIVER (CATLEYA.DLL)

The driver we use is listed as "Integrated Hopper System" and the library name is CATLEYA.DLL (in reference to dredge were it was first developed).

FIGURE 3. Adding the Catleya Driver

It is a complex driver that serves a multitude of purposes:

- Position and depth calculation for drag arms
- Draft and ullage calculation for hopper
- Communication with the Load and Draft Monitor (LDM) system.



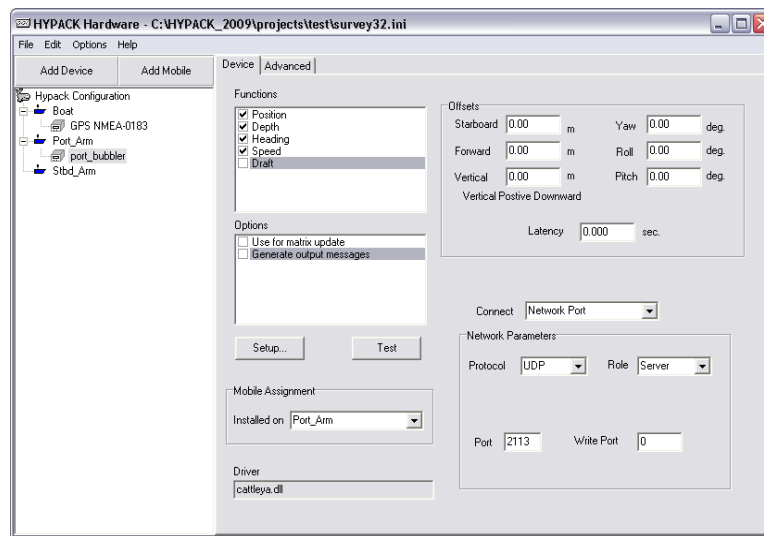
We use the same driver in our hardware configuration twice--once for position and depth of the arm and once for draft and ullage measurements.

CONFIGURING THE ARM POSITION AND DEPTH

When used for position and depth, we don't need the draft information or the output function (used to communicate with the LDM system), so we have to uncheck these functions.

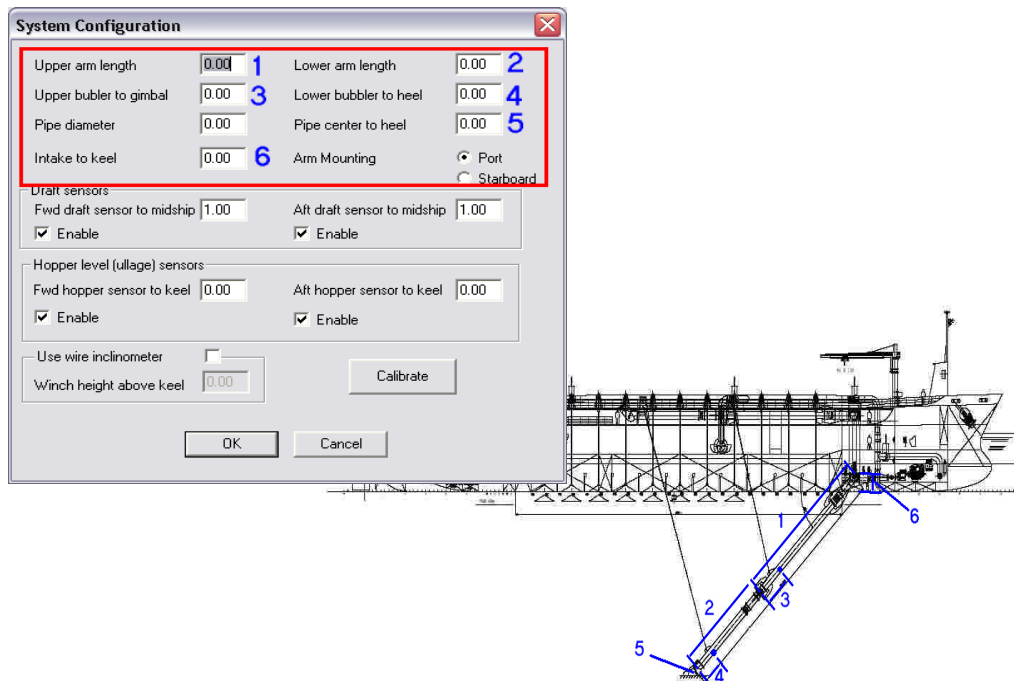
In the network configuration, the read port number must match the one configured in the bubbler system.

FIGURE 4. *Catleya Driver Device Configuration*



The next step is to press [Setup] and enter all the parameters related to arm geometry in the driver configuration dialog box:

FIGURE 5. Catleya Driver Setup



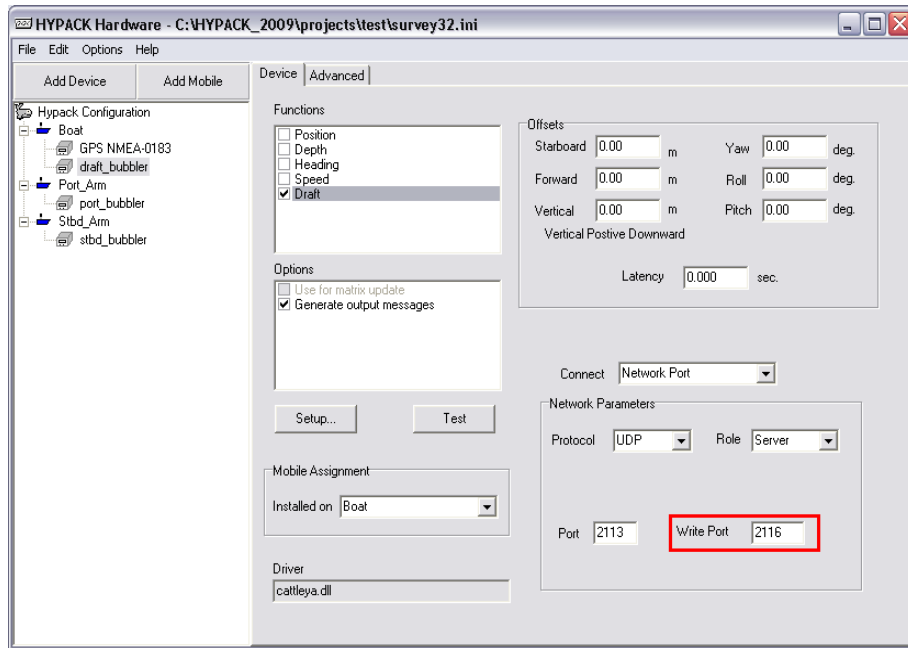
The exact same setup must be repeated for the starboard arm.

HOPPER DRAFT AND ULLAGE

As we said, we use the same driver for the draft and ullage. As the hopper fills, the driver increases the draft and sends the ullage data to the LDM computer.

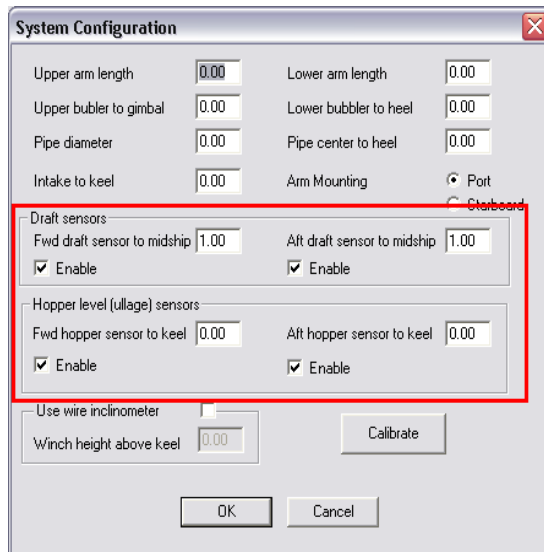
This time we select the 'Draft' and 'Generate Output Message' functions omitted before. We must also configure the write port number because this instance of the driver will send the draft and hopper level values to the LDM program. The default port number for LDM is 2116.

FIGURE 6. Configuring the Catelya Driver for Draft and Ullage



In the driver setup dialog box, this time we have far fewer parameters to enter:

FIGURE 7. Driver Setup for the Catelya.dll Recording Draft and Ullage

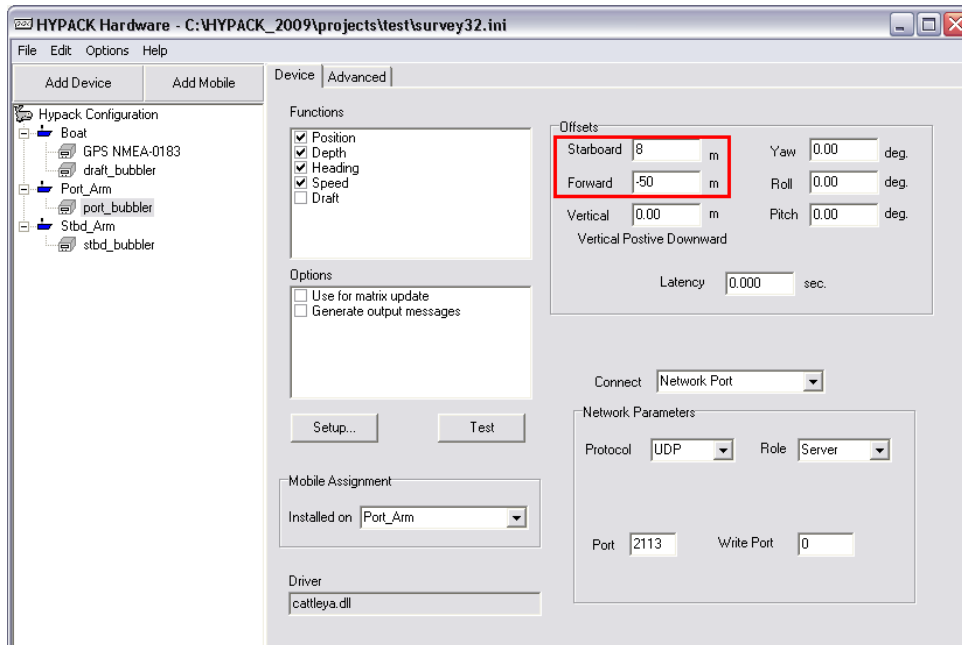


For draft sensors we need their location relative to midship draft scale and for hopper level sensors we need their height above the keel.

OFFSETS

The recommended location for the boat reference point in hopper installations is the stern of the ship on the centerline. More precisely, we like to pick the 0 frame as a reference because

it is easier to figure out the offsets from the boat drawings¹. For drag arms the offsets are the location of the hopper reference point as seen from the arm inlet. Typical settings would be similar to these:



Note: For both arms the forward offset is negative and the starboard offset is positive for the left (port) arm. The GPS forward offset is probably going to be a positive number and the starboard offset depends on the antenna location.

This concludes the configuration that has to be done in the HYPACK® HARDWARE program. It is a good idea to summarize the different network parameters we have entered in a table like this:

Unit	IP Address	Port Number
DREDGEPACK® Computer	192.168.1.1	-
LDM computer	192.168.1.2	2116
Serial to Ethernet converter	192.168.1.3	2112 GPS (port 1) 2118 echosounder (port 2) 2119 spare (port 3) 2120 spare (port 4)
Bubbler	192.168.1.4	211

We still have to configure the bubbler unit itself, the serial to Ethernet converter and calibrate the whole system. Wait for the next installment.

1. Ship builders operate with “frames” that are equally spaced. On most drawings you will find the frame scale somewhere under the boat keel and a note defining the frame spacing. Figuring out a longitudinal offset becomes just a question of finding the frame number and multiplying it by the frame spacing.