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|---|---|
| **WinFrog Device Group:** | **OUPUT** |
| **Device Name/Model:** | **Kongsberg HiPAP Emulator** |
| **Device Manufacturer:** | N/A |
| **Device Data String(s) Output to WinFrog:** | None |
| **WinFrog Data String(s) Output to Device:** | $PSIMMSSB |
| **WinFrog Data Item(s) and their RAW record:** | DP OUTPUT 450<br>DP TARGET N/A |

**DEVICE DESCRIPTION:**

A DP OUTPUT device emulating the Kongsberg HiPAP (USBL) ASCII $PSIMSSB message where the XYZ data are derived from the CRP positions of a single reference and a single target vehicle, and a specified offset on each.

Note: The DP OUTPUT data item must only be assigned to one vehicle and the DP TARGET data item must only be assigned to one vehicle. If either is assigned to more than one vehicle, the data is considered invalid and a message with no data, status set to bad ('V') and the error code set to NRy is generated. The operator is alerted to this problem with an appropriate message box that will re-appear every 60 seconds until the problem is addressed. In addition, the reason for the invalid data is displayed in the IO Device window as "Multiple Vehicles", associated with the relevant vehicle (Reference and/or Target) status.

## *DEVICE CONFIGURATION INSTRUCTIONS*

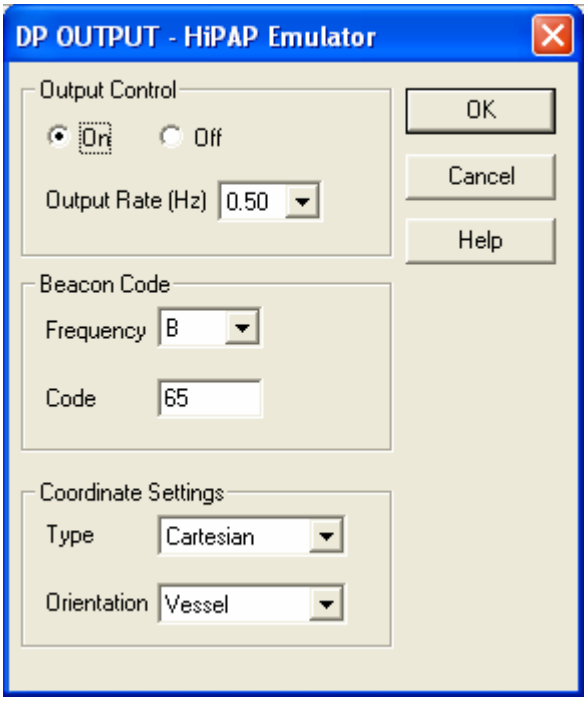
**WINFROG I/O DEVICES > EDIT I/O:**

Interface Type: Serial
Configurable Parameters
- Baud: 9600
- Data Bits: 8
- Stop Bits: 1
- Parity: None

**WINFROG I/O DEVICES > CONFIGURE DEVICE:**

The HiPAP Emulator device is added to WinFrog from the OUTPUT device group.

The device requires configuration. The following dialog box is accessed via the *Configure > I/O Devices > Configuration* command. It can also be accessed by choosing the *Configure Device* command that appears when you right-click in the I/O Devices Window, with the HiPAP Emulator device highlighted.




**Output Control**

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| On/Off | The output is controlled with these options. Note that if set to On, even if the device's data items are not associated with a vehicle, the output starts with the appropriate data indicating that the message does not contain valid data. |
| Output Rate (Hz) | Select the desired output rate from the drop down list. Note that this in Hz, so if it is desired to emulate a standard USBL update rate of every 2 seconds, select 0.50.<br>Note: The output is synchronized to the nearest even second interval based on the selected Output Rate. |

**Beacon Code**

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| Frequency | The HiPAP system supports low frequency (Axx), medium frequency (Bxx) and high frequency (Cxx) transponders. Select A, B or C as desired from the drop down list. |
| Code | Enter the beacon code to use. The allowed range is 1 to 99. |

**Coordinate Setting**

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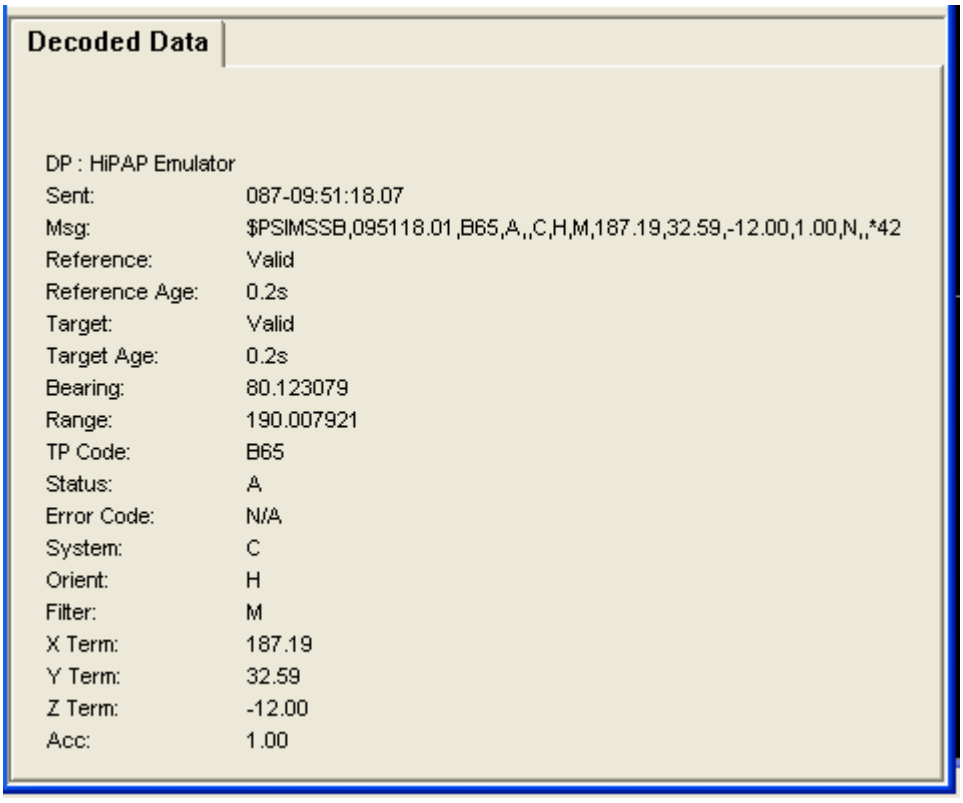
|---|---|
| Type | Select either Cartesian or Polar coordinates for output. See Table 1 below for details.<br>Note: If Polar is selected, the Orientation option defaults to Vessel and is disabled. |
| Orientation | Select the orientation to use, Vessel (bow up), North or East. See Table 1 below for details. |

| Coordinate System | Orientation | X coordinate | Y coordinate |
|---|---|---|---|
| Polar | Vessel | Horizontal range (metres) | Bearing from ship head (degrees) |
| Cartesian | Vessel | Starboard (metres) | Forwards (metres) |
| Cartesian | North | Difference north between ship reference point to beacon (metres) | Difference east between ship reference point to beacon (metres) |
| Cartesian | East | Difference east between ship reference point to beacon (metres) | Difference north between ship reference point to beacon (metres) |

Table 1: Coordinate Type and Orientation Options

**WINFROG I/O DEVICES > IO DEVICE WINDOW:**

The IO Device window display includes the time the message is sent and the message itself. In addition, the status of the Reference and Target position sources is given with the age of the respective data. The individual fields are also displayed with their current data.

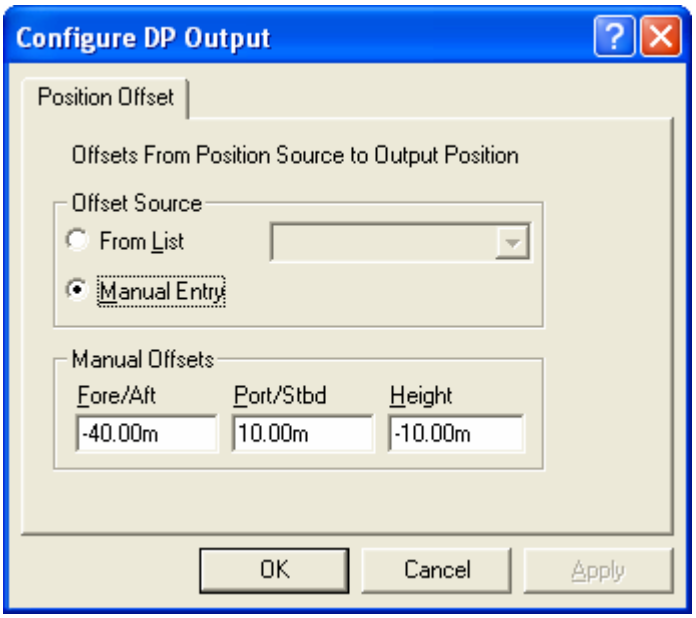



**WINFROG VEHICLE > CONFIGURE VEHICLE DEVICES > DEVICE DATA ITEM > EDIT:**

Adding the HiPAP Emulator device creates two data items: DP OUTPUT and DP TARGET. Once the data items have been added to the vehicle, they must be edited to

suit the application. This involves the specifying of the points on the respective vehicles to be used in calculating the relationship between the vehicles.

**Data item: OUTPUT, HiPAP Emulator, DP OUTPUT**

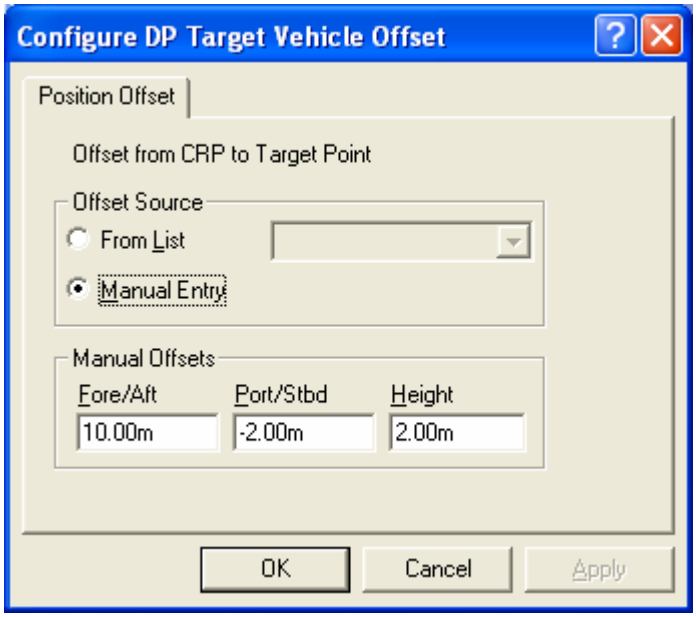



**Offset Source**
Select whether the offset from the respective vehicle's CRP to the point the data in the output message is to be relative to is to be selected from the vehicle's existing Offset List or entered here manually. If it is to be selected from the vehicle's list, the current offsets will be listed in the associated drop down list; select the offset to use.

**Manual Offsets**
If the offset is to be entered manually, enter it here. Note the term Height for the z component. Therefore, if the output data is to be relative to a virtual hydrophone deployed below the water surface, the offset would be negative.

Note: The standard DP OUTPUT data item includes a Position Source tab that supports the selection of the position source to base the output on. This device only uses the respective vehicle's CRP position, regardless of how it is determined or filtered. Therefore, the Position Source tab is not included.

**Data item: OUTPUT, HiPAP Emulator, DP TARGET**




**Offset Source**
Select whether the offset from the respective vehicle's CRP to the point the data in the output message is to be relative to is to be selected from the vehicle's existing Offset List or entered here manually. If it is to be selected from the vehicle's list, the current offsets will be listed in the associated drop down list; select the offset to use.

**Manual Offsets**
If the offset is to be entered manually, enter it here.

**TELGRAM SPECIFICATION:**

The telegram is a $PSIMSSB telegram as defined by Kongsberg, and shown in Table 2 below. It is comma delimited. Note that not all error codes are utilized.

| Field | Contents | Comment |
|---|---|---|
| 1 | $PSIMSSB | Header |
| 2 | hhmmss.ss | Time of data |
| 3 | Beacon code | Frequency and code combined, e.g. B65 |
| 4 | Status | A for OK: This is set to A if<br>• Single associations of both data items exist.<br>• The age of the position data for both vehicles is less than the respective position alarm periods[1].<br>V for not OK: This is set to V if<br>• Single associations of both data items exist but the age of the position data for one or both vehicles is greater than the respective position alarm periods[1].<br>• If the Error Code is determined to be NRy (see below). |
| 5 | Error code | This is set to NRy indicating No Reply if:<br>• Either or both of the position data sources do not exist, i.e. the data item is not associated with a vehicle.<br>• The position data of either vehicle is older than twice their respective position alarm periods[1].<br>• Multiple associations for either or both data item exist.<br>Otherwise, this field is empty. |
| 6 | Coordinate Type | C for Cartesian, P for polar (see Table 1) |
| 7 | Coordinate Orientation | H for vessel head up, N for north, E for East (see Table 1) |
| 8 | Filter status | F (Filtered): If the age of the position data for each vehicle is less than 5 seconds old and the filter setting for both is Kalman Filter, the status is set to F.<br>M (Measured): If the age of the position data for each vehicle is less than 5 seconds old and the filter setting for either or both is not Kalman Filter, the status is set to M. |

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| | | P (Predicted): If the age of the position data for either vehicle is 5 seconds old or greater, the status is set to P. |
| 9 | X term | See Table 1., resolution is 2 decimal places. |
| 10 | Y term | See Table 1., resolution is 2 decimal places. |
| 11 | Z term (Depth) | Depth in meters, resolution is 2 decimal places. |
| 12 | Expected accuracy | The expected accuracy of the position, hard coded to 1.0 metres, resolution is 2 decimal places. |
| 13 | Additional info | N for none. |
| 14 | First addition value | Empty |
| 15 | Second additional value | Empty |
| | *Checksum | NMEA Checksum |
| | CRLF | Termination characters |

[1] The position alarm period is 15 seconds for GPS and USBL.

Table 2. Output Message Format

**Raw Data Logging:**

The raw record logged for this device is the 450, associated with the DP OUTPUT data item. It is logged once a second or when new data is available – to a maximum of once a second, i.e. if the Output Rate is 0.50 Hz (or once every 2 seconds), the raw record is logged every 2 seconds. An example is shown below.

The DP TARGET data item does not produce a raw record.

450-001-W,HiPAP Emulator [on Vehicle1],1175075452.02,32.00000000,-117.00000000,500197.113,3540428.284,80.123079,0.000,190.008,500009.996,3540395.704

where:

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| 450-001-W | record ID, version and source (WinFrog) |
| HiPAP Emulator [on Vehicle 1] | name of device and the vehicle the DP OUPUT data item is associated with. |
| 1175075452.02 | PC time of message output in seconds |
| 32.00000000 | latitude of the reference vehicle CRP |

| | |
|---|---|
| -117.00000000 | longitude of the reference vehicle CRP |
| 500197.113 | Easting of DP TARGET vehicle offset position |
| 3540428.284 | Northing of DP TARGET vehicle offset position |
| 80.123079 | Bearing from DP OUPUT vehicle offset position to DP TARGET vehicle offset position |
| 0.000 | N/A |
| 190.008 | Range in metres from DP OUPUT vehicle offset position to DP TARGET vehicle offset position |
| 500009.996 | Easting of DP OUTPUT vehicle offset position |
| 3540395.704 | Northing of DP OUTPUT vehicle offset position |