Quick Guide to Configuration and Operation of HyperNav Firmware

Startup

When the controller board powers up, its command task sends a **ping** packet to the spectrometer command task, and repeats sending a **ping** every 2 seconds until it receives a response.

After receiving a response to the **ping**, the controller sends

- a **time synchronization** packet
- a **configuration** data packet
- a **query state** packet

to the spectrometer board command task. When receiving a proper **response** to the **query state**, the controller board will enter a 60 second countdown to autonomously start data acquisition.

Any input line on the controller board command line will interrupt autonomous start of data acquisition.

When the spectrometer board powers up, it sends a **StartSpecBoard** packet to the controller board. This packet is relevant when the spectrometer suffered a watchdog reset; when received by the controller, the controller to re-synchronize time and configuration parameters, and to restart data acquisition.

Configuration

The configuration parameters are permanently stored on the userpage or the RTC of the controller board. Shortly after **startup**, a subset of those parameters is sent to the spectrometer board.

To view the configuration parameters present on a given board, type **get** cfg at the command prompt (HyperNav> or HyperNav SpecBoard>, respectively). The output lists the configuration as pairs of **parameter-name** and **parameter-value**. The parameter values can be modified on the controller board by typing **set parameter-name new-value**. The parameters cannot be modified on the spectrometer board.

For ease of use, a list of **parameter-name parameter-value** pairs can be typed into a plain ASCII file, and the file can then be uploaded to the controller firmware. Type **receive cfg** and then send the file via XMODEM.

Accelerometer Calibration and Test

Mount the radiometer body vertically, as it is expected to float in water. Then, at the spectrometer board command prompt, type **CalAcc N** to measure the current vertical acceleration vector. The argument **N** is the number of measurements averaged over. Output is the **acceleration vector** (x, y, z) and the corresponding tilt angles (pitch, yaw).

Manually, assign the three acceleration vector components (x, y, z) to the configuration values on the controller board:

HyperNav> **set ACCVERTX <x-value>**
HyperNav> **set ACCVERTY <y-value>**
HyperNav> **set ACCVERTZ <z-value>**

Also, make sure the accelerometer mounting angle is set to 32 degrees (the angle at which the accelerometer board x-y axes are rotated against the forward-arm axes.

HyperNav> **set ACCMNTNG 32.0**

Power cycle the system. At the spectrometer board prompt, wait some 10 seconds for configuration parameter synchronization. Then, type

HyperNav> **get cfg**

to confirm the accelerometer configuration values are assigned.

Test the accelerometer calibration by typing **tilt N** at the spectrometer board command prompt.

Magnetometer Calibration and Test

At the spectrometer board command prompt, type **CalCompass N** to measure the minimum and maximum magnetic excitation in the ambient field. N is the number of measurements taken. Rotate the radiometer body around all three axes; ideally, all spatial orientation should be covered.

The magnetometer will take a reading every 250 ms, and keep track of the minimum and maximum measurement in x, y, z directions. The current range will be displayed during the acquisition, and the final values will be shown.

Manually, assign the six minimum and maximum values to the configuration values on the controller board:

HyperNav> **set MAG_MINX <min-x-value>**
HyperNav> **set MAG_MAXX <max-x-value>**
HyperNav> **set MAG_MINY <min-y-value>**
HyperNav> **set MAG_MAXY <max-y-value>**
HyperNav> **set MAG_MINZ <min-z-value>**
HyperNav> **set MAG_MAXZ <max-z-value>**

Power cycle the system. At the spectrometer board prompt, wait some 10 seconds for configuration parameter synchronization. Then, type

HyperNav> **get cfg**

to confirm the accelerometer configuration values are assigned.

Test the compass calibration by typing **heading N** at the spectrometer board command prompt.

Pressure Sensor Coefficient Setup and Test

The pressure sensor coefficients are already typed into ASCII.cfg files (attached to Jira issue F20154001-118). Upload the appropriate file by using the **receive cfg** command and then send via XMODEM. Check

with **get cfg** and **reboot** to force a resynchronization of configuration from controller to spectrometer board.

At the spectrometer board command prompt, type **pressuretest N** to perform N pressure measurements.

List of Used Configuration Parameters

SENSTYPE HyperNavRadiometer	
SENSVERS V1	
SERIALNO 2	Radiometer body serial number, use for identification.
PWRSVISR Available	Very low power mode available, not utilized
USBSWTCH Missing	USB not used now, for future use
SPCSBDSN 89383	Starbard spectrometer s/n, associated with wavelength coefficients
SPCPRTSN 89384	Port spectrometer s/n, associated with wavelength coefficients
FRMSBDSN 5	Starboard data frame s/n, set to zero if spectrometer not present
FRMPRTSN 2	Port data frame s/n, set to zero if spectrometer not present
ACCMNTNG 32.000000	Already covered in Accelerometer Calibration
ACCVERTX 12	=
ACCVERTY 67	=
ACCVERTZ -15580	=
MAG_MINX -553	Already covered in Compass Calibration
MAG_MAXX 221	=
MAG_MINY -403	=
MAG_MAXY 298	=
MAG_MINZ -202	=
MAG_MAXZ 682	=
DIGIQZSN 135789	Already covered in Pressure Sensor section
DIGIQZU0 5.899046	=
DIGIQZY1 -3886.869000	=
DIGIQZY2 -10275.890000	=
DIGIQZY3 0.000000	=
DIGIQZC1 -7742.201000	=
DIGIQZC2 310.634200	=
DIGIQZC3 21827.480000	=
DIGIQZD1 0.050436	=
DIGIQZD2 0.000000	=
DIGIQZT1 30.120630	=
DIGIQZT2 1.012252	=
DIGIQZT3 48.038360	=
DIGIQZT4 134.111300	=
DIGIQZT5 0.000000	=
DQTEMPDV 1	Set this to the frequency divider selected on the daughter board

DQPRESDV 1	Set this to the frequency divider selected on the daughter board
PUPPIVAL 0.500000	Profile definition in ascending mode
PUPPSTRT 10.000000	=
PMIDIVAL 10.000000	=
PMIDSTRT 200.000000	=
PLOWIVAL 100.000000	=
PLOWSTRT 1000.000000	=
MSGLEVEL Debug	
MSGFSIZE 0	
DATFSIZE 39	Not used yet
OUTFRSUB 0	Not used yet
LOGFRAMS Yes	Not used yet
OPERMODE APM	Continuous (free-fall mode) or APM (Autonomous Profiling Mode)
OPERCTRL Samples	Obsolete

Data File Offloading

All files are located in subdirectories in a FATFS file system on the controller board eMMC card. Top level of the file system:

HyperNav> list

DIR name is 0:\

	Size (bytes)	Date Time	Name
Dir	0	2028-00-00 00:00:00	DAT
Dir	0	2028-00-00 00:00:00	PROFILE
Dir	0	2028-00-00 00:00:00	FREEFALL
	512	2028-01-01 20:18:12	CONFIG.BCK

Total of 4 items listed.

During continuous data acquisition, frames are logged to FREEFALL\YY-MM-DD\FF-nnnnn.RAW.
To see the date named sub-directories, type

HyperNav> list freefall

To see the log files in a particular directory, type

HyperNav> list freefall\16-09-07

DIR name is freefall\16-09-07

Size (bytes)	Date Time	Name
2	2016-09-07 12:31:18	INFOFILE.BIN
7	2016-09-07 10:45:08	FF-00001.RAW

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      7 2016-09-07 11:05:32    FF-00002.RAW
      7 2016-09-07 11:09:44    FF-00003.RAW
      7 2016-09-07 11:19:24    FF-00004.RAW
      7 2016-09-07 12:31:18    FF-00005.RAW
Total of 6 items listed.
```

To offload a particular file, type

```
HyperNav> send freefall\16-09-07\FF-00004.RAW
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Then, start a XMODEM exchange in the terminal emulator to receive transfer the file to the PC.