

Test Case

TC107 Signal K delta/updates as input



Belongs to Plan(s): TP5 dashboard_tactics...

Belongs to Suite(s): TS38 NMEA simulator ...

Case Type: Functionality

Label(s): *click to add Label(s)*

Test Quality: EXCELLENT Defects Closed Fixed

Assign To: Petri Makijarvi

Case Priority: Medium

Estimate: 3600

Is Automated

Precondition

NOTE this is a very long test, testing all Signal K connection aspects - you can run this in several steps, on different days - just do not dismantle the test setup in between.

Signal K Server and NMEA simulator <http://www.kave.fi/Apps/> are used in this test together so that the NMEA simulator feeds the Signal K Server Node either with NMEA0183 or NMEA2000 sentences, according the test.

The NMEA simulator is talking to COM29 virtual port and COM30 will be its output using the virtual driver. Once Signal K server is started, in <http://localhost:3000> the input is set like this:

Input Type	NMEA0183	
Enabled	<input checked="" type="checkbox"/> YES <input type="checkbox"/>	
Logging	<input checked="" type="checkbox"/> YES <input type="checkbox"/>	
ID	NMEA-Simu	
NMEA 0183 Source	Serial <input type="button" value="▼"/>	
Serial port	Enter manually <input type="button" value="▼"/>	COM30
Baud Rate	115200	
	Example: 4800	
Output Events	<input type="text"/>	
	Events that should be written as output to this connection. Example: nmea0183,nmea0183out	
Sentence Event	emu0183	
	Event name for incoming sentences. Example: nmeadata	
Validate Checksum	<input checked="" type="checkbox"/> YES <input type="checkbox"/>	
Append Checksum	<input type="checkbox"/> NO	Turn Validate Checksum OFF to enable appending the checksum
Remove NULL characters	<input type="checkbox"/> NO	
Ignored Sentences	<input type="text"/>	
	NMEA0183 sentences to throw away from the input data. Example: RMC,ROT	

The output to the test is the Signal K Server's TCP output on port 8375, which can not be tested by opening a browser.

browser in http://localhost:8375: Since v1.18.0 there is a socket leverl hand-shaking needed to subscribe to data and the connection message is not interpreted with browsers - this test is intended to be executed with Signal K Server Node 1.34.0 or superior - you will need to use Server Log feature in Signal K server: by selecting signalk-provider-tcp one can observe the connection state of the TCP-connection.

For setting and selection of sentences in NMEA simulator, they are done the same way as in earlier static tests.

Important : make sure that OpenCPN itself does not have any data coming in from any other source, for example by disabling all its inputs: at one point we will enable OpenCPN input but from Signal K web-socket port 3000

Configuration: the plugin's data folder has a configuration file defined by configuration file variable:

[PlugIns/DashT/Tactics/SteamInSk]

ConfigFile=streamin-sk.json

You should set the debug level to 3 for this test. Verify also that the server is pointing to host on which your Signal K server is running.

```
"streaminsk" : {  
    "source"          : "localhost:8375", // not limited to localhost  
    "api"             : "v1.34.0",        // version of Signal K server  
    "connectionretry" : 5,                // [s](min.=1s to reduce CPU load)  
    "timestamps"      : "server",         // Signal K "server" or "local"  
    "verbosity"       : 3                 //0=no,1=events,2=verbose,3+=debug  
}
```

Steps

Click "Tab" or "Shift + Tab" to navigate grid. "Double click" on step sequence to change them. [?](#)

1

Connection test 1 : without starting the Signal K server or stopping it first, verify that the opening instrument is showing the socket connection attempt heartbeat in form of arrows moving from right to left about once per every two or three seconds:

In the *opencpn.log* file the above situation is indicated only once:

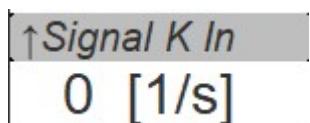
```
21:59:48.635 MESSAGE StreamInSkSingle.cpp:749 dashboard_tactics_pi: StreamInSkSingle :  
SKTM_STATE_INIT : (localhost:8375)  
...  
21:59:50.857 MESSAGE StreamInSkSingle.cpp:749 dashboard_tactics_pi: StreamInSkSingle :  
SKTM_STATE_ERROR (refused by peer)
```

2

Confirm that you have observed all the above states in the Signal K In indicator: PASS or FAIL.

2

Connection test 2: Once the connection has been established, but there is no data coming in (NMEA simulator is not running), the connection situation changes:



In the *opencpn.log0*-file this situation is indicated as (with debug level higher than 2):

```
22:10:10.346 MESSAGE StreamInSkSingle.cpp:749 dashboard_tactics_pi: Signal K JSON update server received Hello-message:  
{  
    "timestamp" : "2020-10-06T20:10:09.665Z",  
    "name" : "signalk-server",  
    "version" : "1.34.0",  
    "self" : "vessels.urn:mrn:signalk:uuid:852fb837-0072-418f-aa7e-388d5dc22988",  
    "roles" : [  
        "master",  
        "main"  
    ]  
}
```

One shall repeat the connection test using the Signal K server node debug feature: On the Signal K server log file one can set the debug variable `signalk-server:interfaces:tcp:signalk`

```
Oct 06 22:36:49 signalk-server:interfaces:tcp:signalk Ended:0 ::ffff:127.0.0.1:52373 +5s  
Oct 06 22:36:49 signalk-server:interfaces:tcp:signalk Close:false 0 ::ffff:127.0.0.1:52373 +12ms  
Oct 06 22:36:52 signalk-server:interfaces:tcp:signalk Connected:1 ::ffff:127.0.0.1:52379 +3s  
Oct 06 22:36:52 signalk-server:interfaces:tcp:signalk subscribe:[{"context": "vessels.self", "subscribe": [{"path": "environment.depth.belowKeel"}, {"path": "environment.depth.belowTransducer"}]}, ...]
```

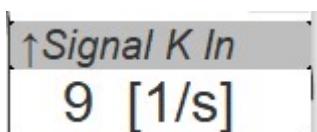
The above indicates that the Signal K interface has subscribed to all vessel data in order to collect a list what is available on the the Signal K Server Node.



PASS or FAIL

3

Connection test 3: Once the NMEA simulator is started and data is flowing in, we get the number of parsed and transmitted values per second on the display:



With the debug levels higher than 2 in the configuration, the above is also visible in the `openCPN.log` file, after the above handshaking message:

```
22:46:47.144 MESSAGE StreamInSkSingle.cpp:749 dashboard_tactics_pi: StreamInSkSingle : SKTM_STATE_READY
```

You can increase the debug level to 6 to get detailed handshaking information, like the default values to be subscribed into:

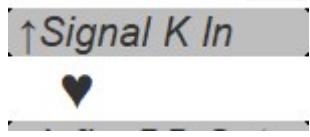
```
22:53:19.831 MESSAGE StreamInSkSingle.cpp:749 dashboard_tactics_pi: StreamInSkSingle: OnTheFly :  
writing out to socket: {"context" : "vessels.self","subscribe" : [{"path" : "environment.depth.belowKeel"},  
 {"path" : "environment.depth.belowTransducer"}, {"path" : "environment.outside.pressure"},  
 {"path" : "environment.water.temperature"}, {"path" : "environment.wind.angleApparent"},  
 {"path" : "environment.wind.angleTrueWater"}, {"path" : "environment.wind.speedApparent"},  
 {"path" : "environment.wind.speedTrue"}, {"path" : "navigation.courseOverGroundTrue"},  
 {"path" : "navigation.datetime"}, {"path" : "navigation.headingMagnetic"}, {"path" : "navigation.headingTrue"},  
 {"path" : "navigation.log"}, {"path" : "navigation.magneticVariation"},  
 {"path" : "navigation.speedOverGround"}, {"path" : "navigation.speedThroughWater"},  
 {"path" : "navigation.gnss.methodQuality"}, {"path" : "navigation.gnss.satellites"},  
 {"path" : "navigation.position.latitude"}, {"path" : "navigation.position.longitude"},  
 {"path" : "navigation.trip.log"}, {"path" : "navigation.courseRhumbline.nextPoint.bearingTrue"},  
 {"path" : "navigation.courseRhumbline.nextPoint.distance"},  
 {"path" : "navigation.courseRhumbline.nextPoint.velocityMadeGood"},  
 {"path" : "steering.rudderAngle"}]}
```

One can also observe how the Signal K communicates the delta values to the subscribed data, for example:

```
22:53:20.147 MESSAGE StreamInSkSingle.cpp:749 dashboard_tactics_pi: DEBUG:  
Signal K JSON update server received delta-message:  
{  
    "context" : "vessels.urn:mrn:signalk:uuid:852fb837-0072-418f-aa7e-388d5dc22988",  
    "updates" : [  
        {  
            "source" : {  
                "talker" : "HC",  
                "label" : "NMEA-Simu",  
                "sentence" : "HDT",  
                "type" : "NMEA0183"
```

4

Connection test 4: Restart now the OpenCPN without making changes in the Signal K server or NMEA simulator. In the beginning, instead of the number value, you should observe a heartbeat. This is because the timer event is not precise in the beginning and it is not possible to show anything meaningful what comes to actual throughput:



PASS or FAIL

5

Connection test 5: Connection / Re-connection:

Stop the signalk-server. Wait until arrows moving from right to left do appear again, in five seconds. Observe all the instruments feeds, they should go to their empty values (but not navigation location which is coming from *O*). Start signalk-server again. Within a few seconds, the communication should be reconnected and the numerical values be displayed again.

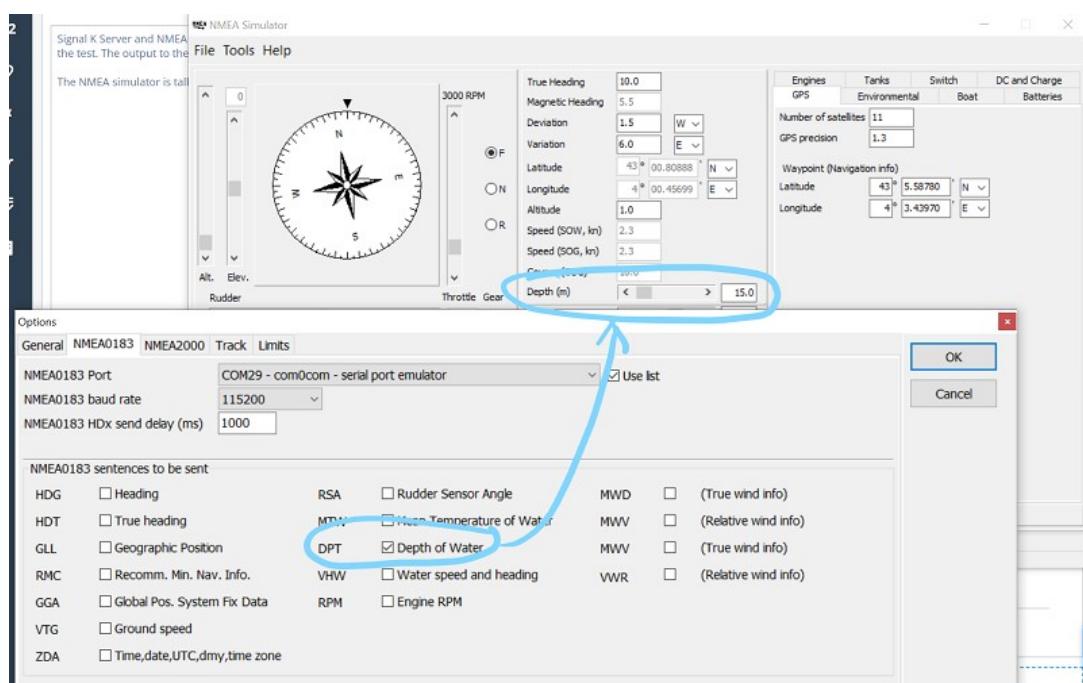


PASS or FAIL

6

Depth NMEA-0183 DBT

Select from emulator only the DPT sentence to be sent out:

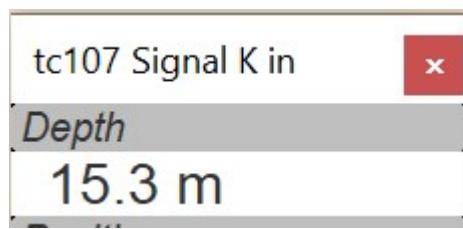


Set the depth to contain a decimal after the meters, like 15.3, meters

Create a single streaming-in Signal K instrument; with the above emulator data it should show one data even per second:



Create a dedicated instrument frame for this test and put a depth indicator (single instrument) in it. It should show the same value and when you move the emulator dial it shall move instantly.



PASS or FAIL.

7

GPS NMEA-0183 GGA

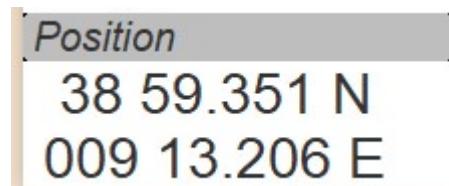
Production level test: SKIP - in normal operation, O defines the "fix" and provides the boat position, which is used with first priority. It may or it may come from this very same sentence, originally (its NMEA0183 format) but that information is not available. In Dashboard, this entry has priority level 3, so it not passed to instruments what comes to latitude and longitude since the O provided value overrides it. Therefore, no way to test it, nothing will be shown. However, DNSS Fix and number of satellites are used, internally.

Development level test: PASS or FAIL

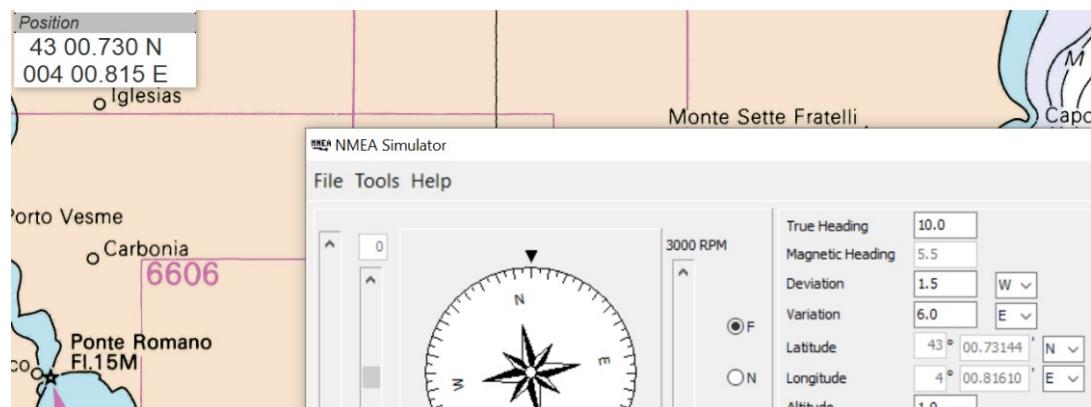
Due to priority selection, it is possible to test latitude and longitude changes only if one changes the in the source code the priority from the default level 3 to 1, which is the same in O given "fix" (which is actually the boat's position on the chart, not a GPS fix, necessarily). You would see some skipping back and forth (between O "fix" and this sentence) on the position displays and this is the indication that this call is passing. Internally, we get the GNSS Fix and number of satellites set, but for now, use the debugger to see those values.

Screenshots:

You have the boat position somewhere in the map and that is the position shown when the NMEA simulator and Signal K are not sending anything. Make sure that O does not have any other data source:



Now, make your boat moving with NMEA Simulator (put some throttle) send only GGA or GLL sentences (depending of the test, see below), they will be sent once every second. You have time to see the position blinking between the boat's chart position (O) and the value sent by the NMEA simulator:



Important: after the debug test, return the priority values to their original values (3 for GGA and 2 for GLL).



SKIP / PASS or FAIL

8



GPS NMEA-0183 GLL

Production level test: SKIP - see GGA, same explanation. However, no DNSS Fix or number of satellites here. Also, if the sentence is not valid, Signal K is not transmitting it at all as a delta.

Development level test: PASS or FAIL

(see above GGA test for the screenshots)

Due to priority selection, it is possible to test latitude and longitude changes only if one changes the in the source code the priority from the default level 2 to 1, which is the same in *O* given "fix" (which is actually the boat's position on the chart, not a GPS fix, necessarily. You would see some skipping back and forth (between *O* "fix" and this sentence) on the position displays and this is the indication that this call is passing. **Note:** if the sentence is not valid, Signal K is not transmitting it at all as a delta.



SKIP / PASS or FAIL

9

NMEA-0183 HDG

Make sure that the World's Magnetic Variation Plugin is turned OFF

In the NMEA simulator check in Tools -> Options HDG tick box.

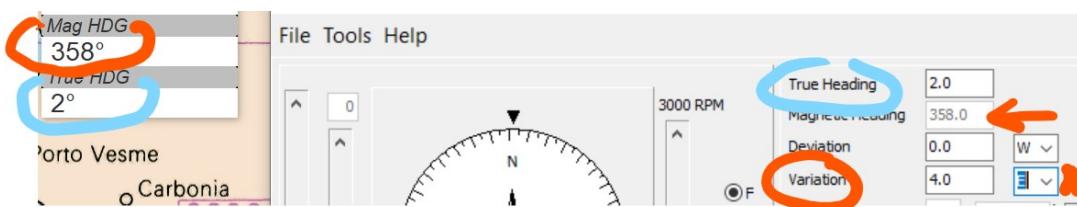
Check the following condition:



Change the variation to East:



Test the two use cases around the 360 degrees:



♂

All four tests PASS or any of them FAIL

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NMEA-0183 HDM

There is no HDM-sentence in the NMEA-simulator. Turn it off (or just un-tick 'Run'). Instead we're going to give Signal K serve a test file. Load this file in your \$HOME/.signalk :

tc107_HDM.zip

NOTE: If you are using signalk-server package for Windows which self-installer for node.js, the path for reading the files is actually C:\signalk\nodejs\node_modules\signalk-server\node_modules\@signalk

Tell Signal K to read that file and stream it out:

Input Type

FileStream

Enabled

YES

ID

cagliari

Data Type

NMEA 0183



File Name

tc107_HDM.txt

Apply

Cancel

Note that you need to restart the signalk-server, most probably. You can detect if the file has been read from the main dashboard:

Connection activity (deltas/second)



Also, the lack of an error message about this file not being found is a good indicator... Otherwise, signalk-server console is telling where it is looking from the file.

Launch OpenCPN with the above HDG test instruments.

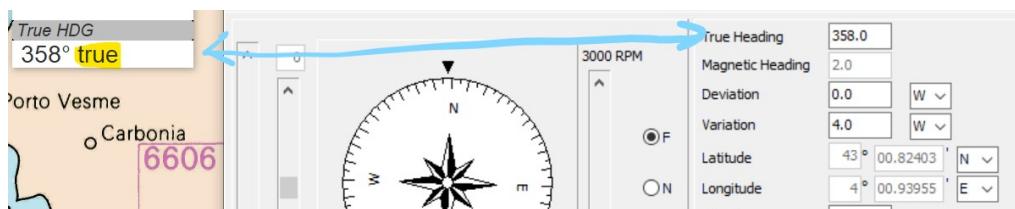


You should see the magnetic heading varying as in the test file, now with add-on "mag" in the unit, which is an indicator that it is indeed coming from HDM-sentence and not from HDG-sentence in which this add-on is not used in Dashboard. Also, there is no True heading calculated as with HDG-sentence.

11

NMEA-0183 HDT

Note: in previous step, a streamed input file was used in Signal K server. Disable it. You need to restart the server. In NMEA simulator, set only the HDT sentence to be sent out. Verify that the value indicated in the True HDG instrument is the same as that you have set in the NMEA simulator and that the word "true" appears after the value's degree sign:



PASS or FAIL

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NMEA-0183 MDA

Back to the streamed file, stop the NMEA simulator. See above for the instructions. the file is below, containing both barometric and temperature data but only barometric is used by Dashboard.

tc107_MDA.zip

The output is as follows:

Barometric pressure
1015.0 hPa

NOTE: In SignalK-servers prior to v1.19 this value was sent in delta channel as [hPa], after it as [Pa], which is the SI-unit. Thus DashT v2.0 requires and recommends SignalK node server v1.35 or superior and makes the unit change to [hPa].

Observe also the delta update speed: in Signal K it is, for example 25 updates per second. In Dashboard Tactics, the Signal K input connector shall indicate the same speed, despite the fact that the tes file NMEA-message contains both the the barometric pressure and the outside temperature value.

EXPLANATION: We subscribe to barometric data only, not to outside temperature value. While Signal K server node is counting the NMEA messages it is dealing with, containing both values from the file, the Signal K streamer in DashT receives only one data value. If we would subscribe to the outside temperture value as well (we do not have an instrument for it so we do not) we would get the double data rate. Now the data rates are the same.

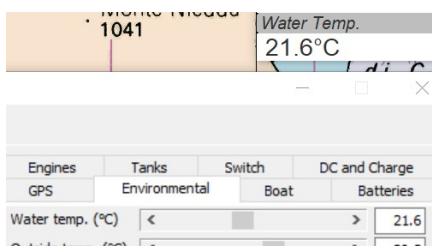


PASS or FAIL

13

NMEA-0183 MTW

This test is done using NMEA simulator. If you have, in the above tests some provider NMEA files running in Signal K server, disable them and restart the server. Start the simulator. Select only MTW. Set the temperature and check that the value indicated in the Water Temperature instrument matches the selected value in the simulator (use the slider):



PASS or FAIL

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NMEA-0183 MWV

This test is done with the NMEA simulator. Select only MWV as output. Set some speed with the throttle and set the wind coming one direction, then another side of the boat, to see if the values correspond those of the simulator and that the arrows are correctly oriented.



Stop the NMEA simulator. Set and restart the Signal K server with this test file:

tc107_MWV.zip

You should now observe the true wind speeds between 20 - 30 knots coming from direction 150 - 240 degrees and the values should be live.



PASS or FAIL

15



NMEA-0183 RMB

This test is done without the NMEA simulator, stop it. Start the Signal K with only this test file to play out:

tc107_RMB.zip

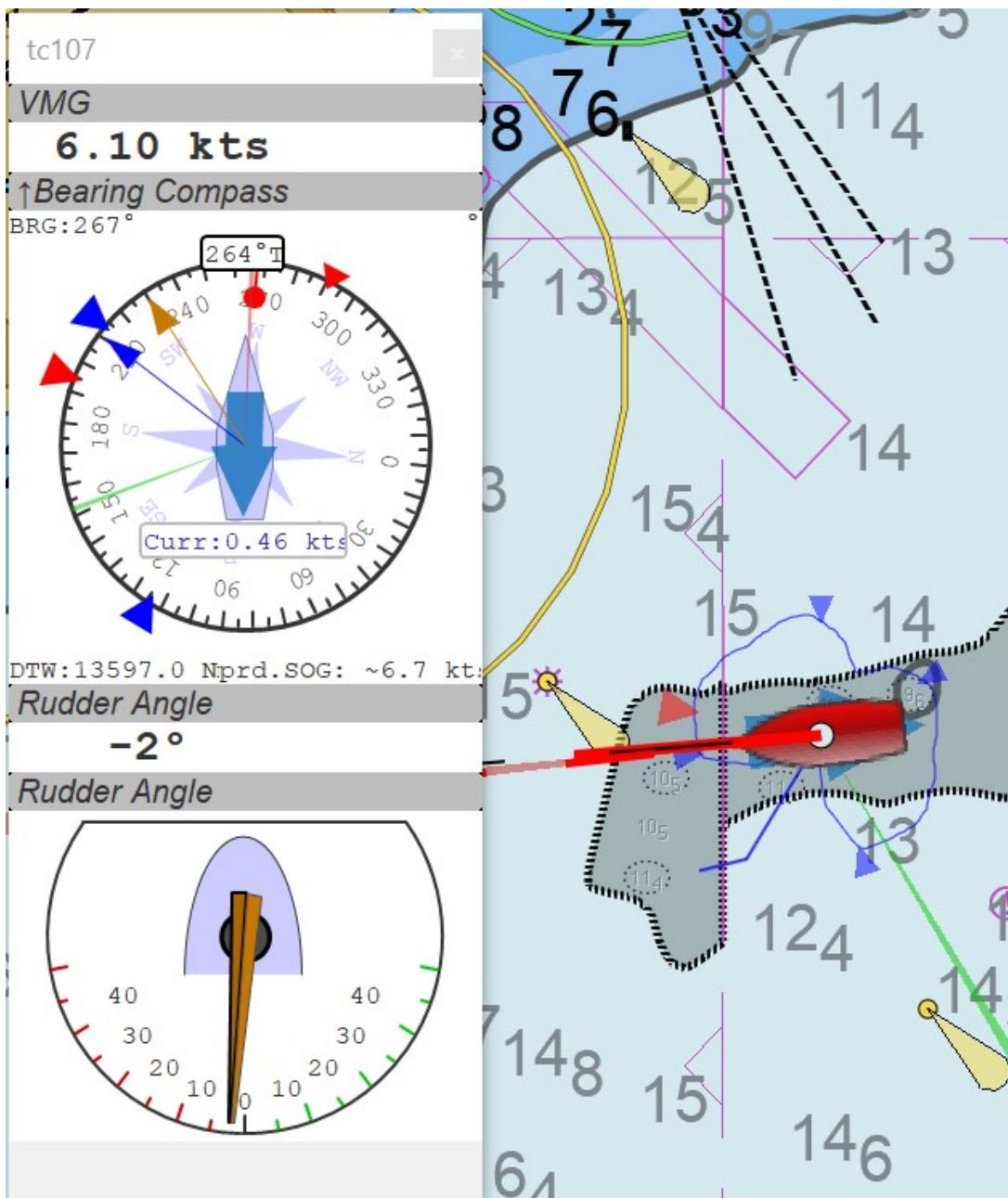
You should see VMG instrument values between 1 - 6 knots like this:



Disable the above RMB file and start a file with other sentences as well, to allow the usage of the bearing compass:

tc107_RMB2.zip

The sentences contained in this test file are all those one needs to build the bearing compass display, one of the key instruments in Tactics. One of the values is requires is the bearing obtained from the RMB. Using a polar file, one should get this type of display:



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GPS NMEA-0183 RMC see GPS NMEA-0183 GGA and use the same procedure.

NOTE: if in the previous tests the OpenCPN's input from Signal K was activated, turn it OFF so that we have the certitude that the instruments get their position data from the RMC sentence, not from the OpenCPN as ship position (which may be another sentence). Please note that also in this test the source code priority needs to be set temporarily set to 1. After the development test it's priority needs to be returned to 4.(which means that it will be never used since the OpenCPN ship position prevails.



PASS or FAIL.

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NMEA-0183 RMC (SOG, COG and magnetic variation)

NOTE: as with the GPS test. the priority must be set to 1 and then after the test returned for all elements to 3. This makes this test usable only in development phase. For production level testing, skip it.

tc107_2 Sig...

SOG
1.60 kts

COG
358°

While SOG and COG are visible with the simple instruments, for magnetic variation one can use the debugger with a breakpoint and observe the value. It is noteworthy that the actual correction function has already been tested above (see NMEA-0183 HDG).



PASS or FAIL.

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NMEA-0183 RSA

Test with the NMEA simulator:

Test without Signal K node server - Dashboard NMEA-0183 parser as reference

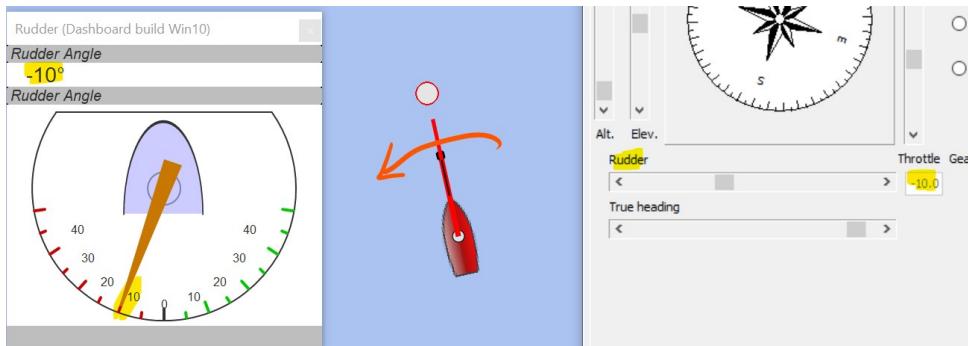
Turn off Signal K node server you have been listening.

Note: Using this simulator 2019-07 version, please take into account that it sends a sentence only for one rudder, while OpenCPN Dashboard requires a sentence for two rudders, even if the second rudder is not there. The two extra arguments can be easily added using NMEA Converter:

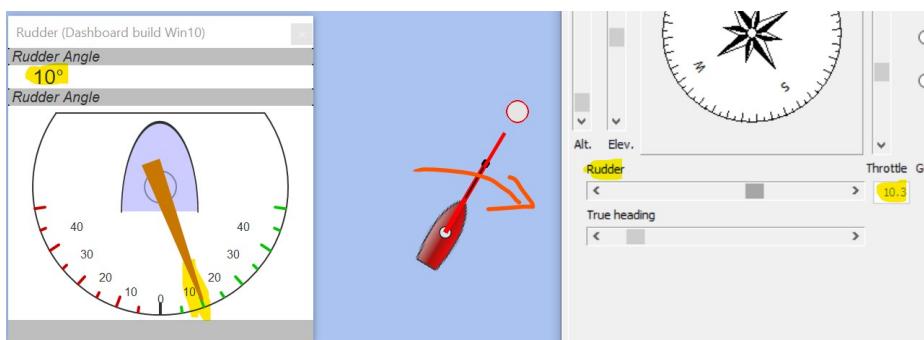
\$YDRSA,\$GPRSA1,\$GPRSA2,,V

In version of the simulator 2019-11, the NMEA Converter fix is not necessary anymore.

Rotate boat to port side by turning the emulator rudder slider to negative side, and observe the angle displayed being also negative:



Rotate boat to starboard side by turning the emulator rudder slider to positive side, and observe the angle displayed being also positive:



Test with Signal K node server

Provide two path of data from Signal K node server to OpenCPN as usual: the NMEA-0183 stream as TCP or UDP and activate DashT Signal K Input Streamer.

The input streamer interprets also the rudder angle from the emulators NMEA-0183 stream and sends it as Signal K data delta.

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NMEA bypassing from OpenCPN

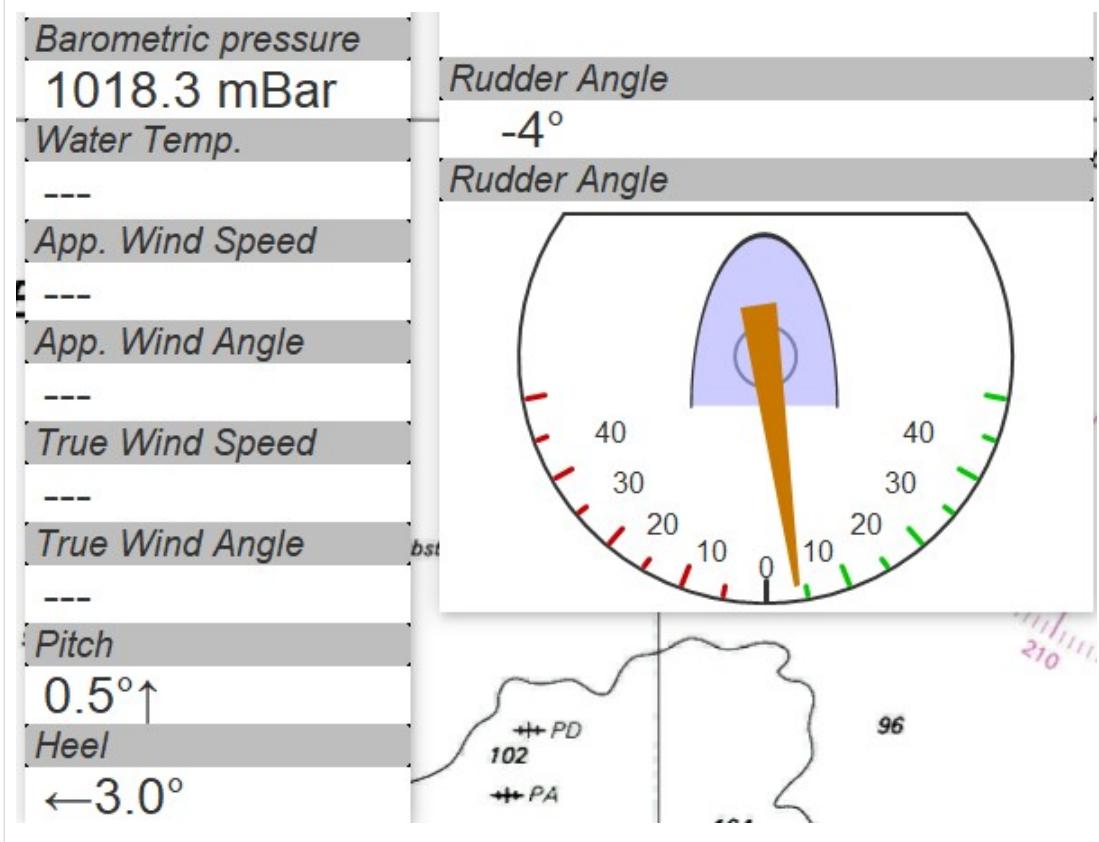
This test is to see that the alternative path from OpenCPN remains valid for the sentences which are available from Signal K as NMEA sentences to OpenCPN but which are not available as Signal K diffs converted from NMEA sentences in delta-channel (as JSON structures on a different socket).

XDR sentences

Barometric, heel and pitch are typical of these sentences. Set the Signal K to repeat both the NMEA Simulator (continue with the test of RSA, the rudder angle, above. Play back with OpenCPN VDR-recorder this XDR test file:

tc107_XDR.zip

Have pitch, heel and barometric numerical instruments visible, on top of the RSA sentence simulator above. You should see all three XDR values moving along with the rudder indicator:

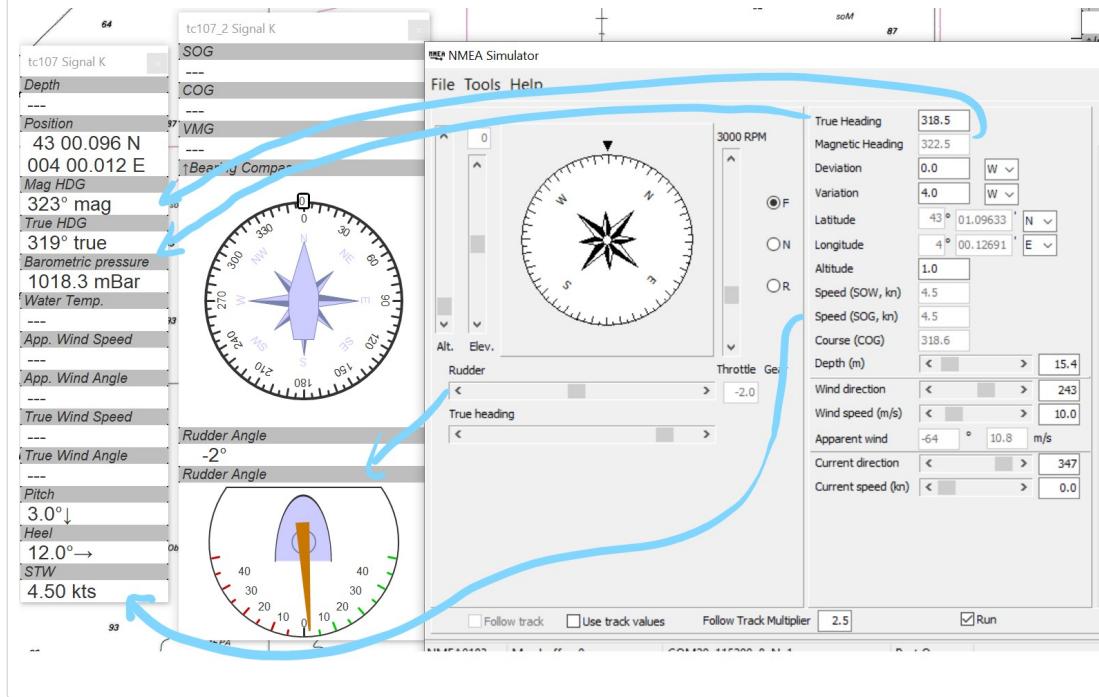


PASS or FAIL.

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NMEA-0183 VHW

Continue with the previous test (RSA), go to the NMEA simulator and add to RSA sentence output the VHW output. Keep the boat going with some reasonable speed and angle and observe the true heading, magnetic heading and speed through water values as illustrated below:



PASS or FAIL.

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NMEA-0183 VLW

This test is done without NMEA simulator which does not support VLW, stop it.

In the Signal K server, launch the following NMEA-0183 file stream provider

tc107_VLW.zip

You should see the following type of output:

```
Trip Log
39.4 NMi
Sum Log
3351.3 NMi
```

NOTE: this ZIP file contains negative and erroneous values for the total log count, they should be ignored and you should see only positive, increasing values (which will then start all over again from the beginning in this looped file test).



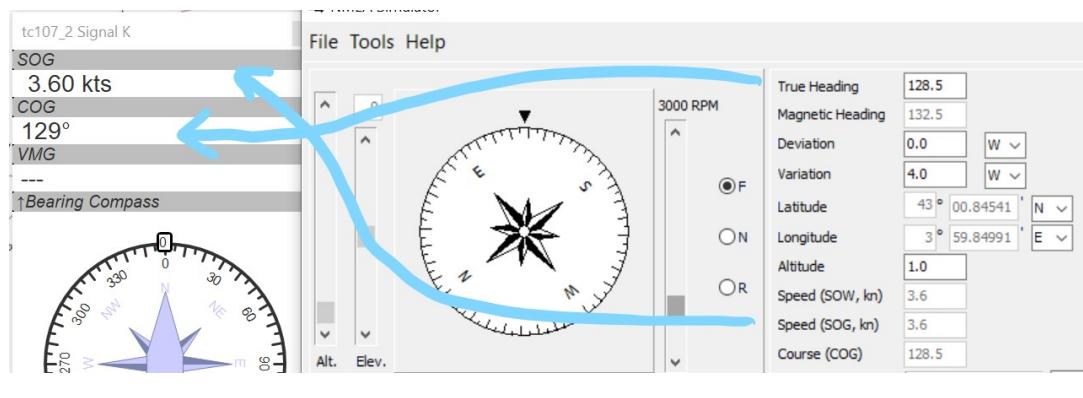
PASS or FAIL

22

NMEA-0183 VTG

This sentence is supported by NMEA simulator so let's use it. You can leave the VLW stream coming in if you like to make this test faster.

After the setup, you should see a situation like this:



PASS or FAIL

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NMEA-0183 VWR

This test is done with the NMEA simulator which is supporting it nicely (changing the direction and the speed of the wind). You should see:



Change the wind direction coming from the port side and verify the direction change in the numerical App.Wind Angle instrument.

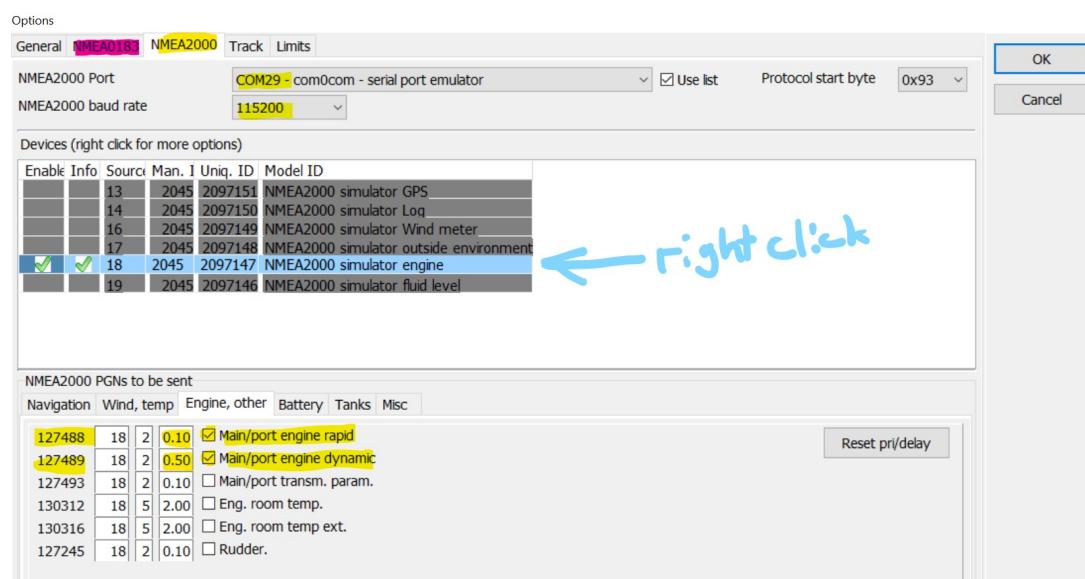


PASS or FAIL.

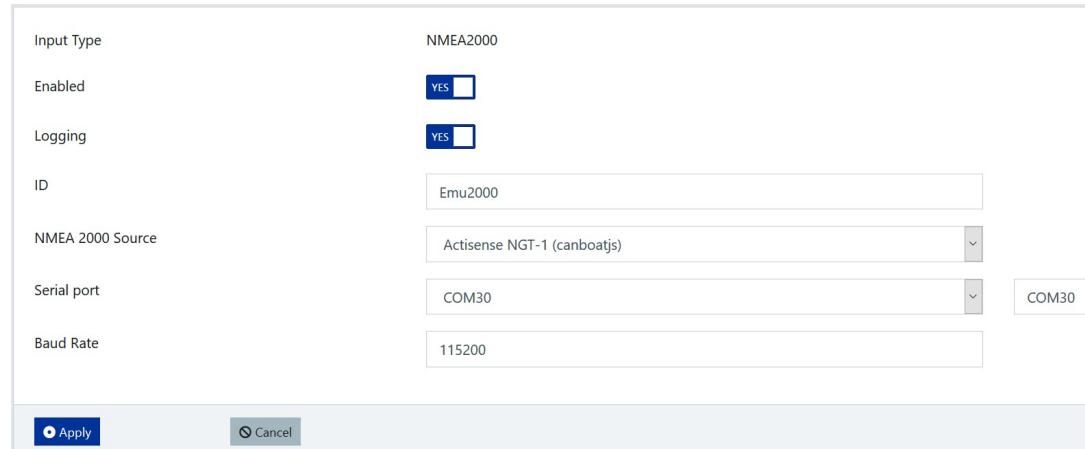
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NMEA-2000 Main or Port Engine

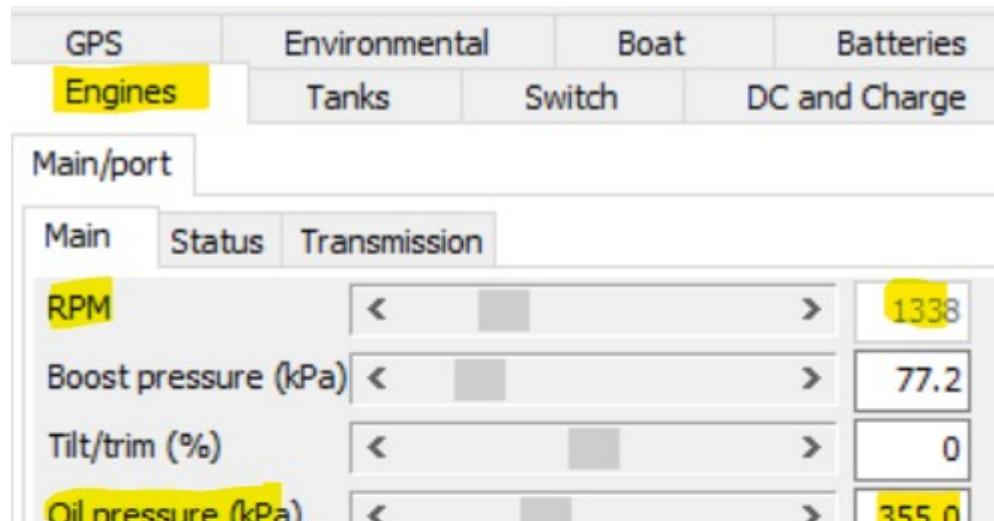
Switching to NMEA-2000 using the NMEA simulator requires that its NMEA-0183 output needs to be stopped (we have in this test bed only COM29 which is mirrored out to COM30 port, received by Signal K server). Same thing on Signal K server, stop its NMEA-0183 input from COM30. Set the NMEA Simulator as follows for NMEA-2000 after having disabled the NMEA-0183:



On Signal K server, the input setting for the output of the NMEA simulator:



On the NMEA simulator, set the Engine room parameters as follows (note that for the RPMs you need to set the throttle):

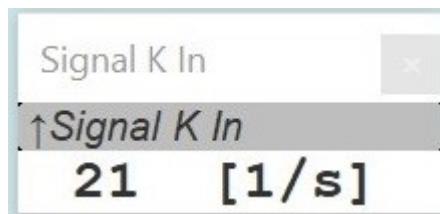


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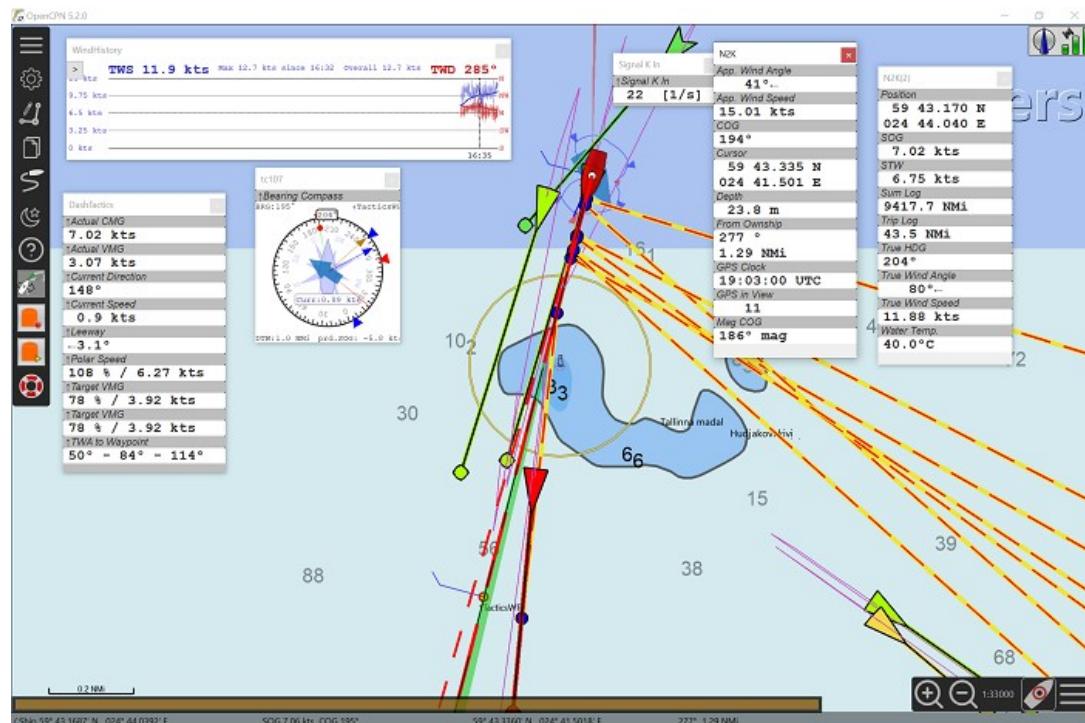
In this test we observe the navigational and other data which is not coming from NMEA-0183 source. In order to maximize the coverage, make the Signal K server to run it's aavan2k.dat example N2K data recording (from the Bay of Finland):

Make so that the OpenCPN v5.2 or superior subscribes to the same data, from the same Signal K server node, for the GPS data notably.

Using the ini-files in the distribution's integrated tests (or arranging yourself), drive in the data from the example playback:



Observe the instrument array: the following instruments all shall be presented with a value which updates regularly:



Apart the data being shown on all instruments, observe that there is no timeouts (about every 5 seconds) on any of the presented instruments.



PASS or FAIL

⊕ Add Steps

Attachments

« < 1 2 3 4 5 ... > »

Add Attachments

RESULTS	DEFECTS			
Status	Test Plan Run	Assigned To	Updated At↑	Actions
✓ Pass	TPR81 dashboard_tactics_p...	Петри Макијарви	about a year ago	
✓ Pass	TPR82 Signal K HDG senten...	Петри Макијарви	about a year ago	
✓ Pass	TPR83 dashboard_tactics_p...	Петри Макијарви	about a year ago	
✓ Pass	TPR84 dashboard_tactics_p...	Петри Макијарви	about a year ago	
✓ Pass	TPR85 dashboard_tactics_p...	Петри Макијарви	about a year ago	

« < 1 2 3 > »

ACTIVITY	HISTORY	COMMENTS
TODAY		
Petri Makijarvi	Updated Test TC107 Signal K delta/updates as input less than a minute ago / Oct 25, 2020	