

Test Case

TC107 Signal K delta/updates as input

**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:** 600**Is Automated**

Precondition

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 either with NMEA0183 or NMEA2000 sentences, according the test. The output to the test is the Signal K Server's TCP output on port 8375, which can be tested by opening a browser in <http://localhost:8375> (don't leave it running during 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"/>
Logging	<input type="checkbox"/> [file]
ID	Emu0183
NMEA 0183 Source	Serial
Serial port	COM30
Baud Rate	4800 Example: 4600
sentenceEvent	Emu0183 Example: nmeadata
Validate Checksum	<input checked="" type="checkbox"/>

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.

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

[PlugIns/Dashboard/Tactics/StaminSk]

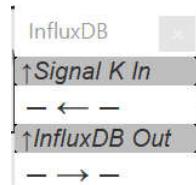
ConfigFile=streamin-sk.json

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

Steps

Click "Tab" or "Shift + Tab" to navigate grid ⓘ

- 1** !! Connection test: without starting the Signal K server or stopping it, 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:

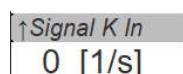


In the *opencpn.log* file the above situation is indicated only once:

2:20:51 PM: dashboard_tactics_pi: SignalK Delta Streamer : SKTM_STATE_ERROR (refused by peer)

2:20:51 PM: dashboard_tactics_pi: DB Streamer : STSM_STATE_ERROR (refused by peer)

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



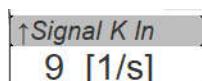
In the *opencpn.log* file this situation is indicated as (with debug level higher than 2):

2:27:15 PM: dashboard_tactics_pi: SignalK Delta Streamer : SKTM_STATE_WAITING

2:27:15 PM: dashboard_tactics_pi: SignalK Delta Streamer : SKTM_STATE_READY

2:27:20 PM: dashboard_tactics_pi: ERROR Signal K JSON updates: sync lost, waiting...

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:

2:37:09 PM: dashboard_tactics_pi: Signal K type (NMEA0183) sentence (GLL) talker (GP) src () pgn (0) timestamp (2019-09-15T13:37:09.000Z) path (navigation.position) key (longitude) value (4.014167), valStr (4.014167333)

2:37:09 PM: dashboard_tactics_pi: Signal K type (NMEA0183) sentence (GGA) talker (GP) src () pgn (0) timestamp (2019-09-15T13:37:09.000Z) path (navigation.position) key (longitude) value (4.014167), valStr (4.014167333)

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:



Connection / Re-connection:

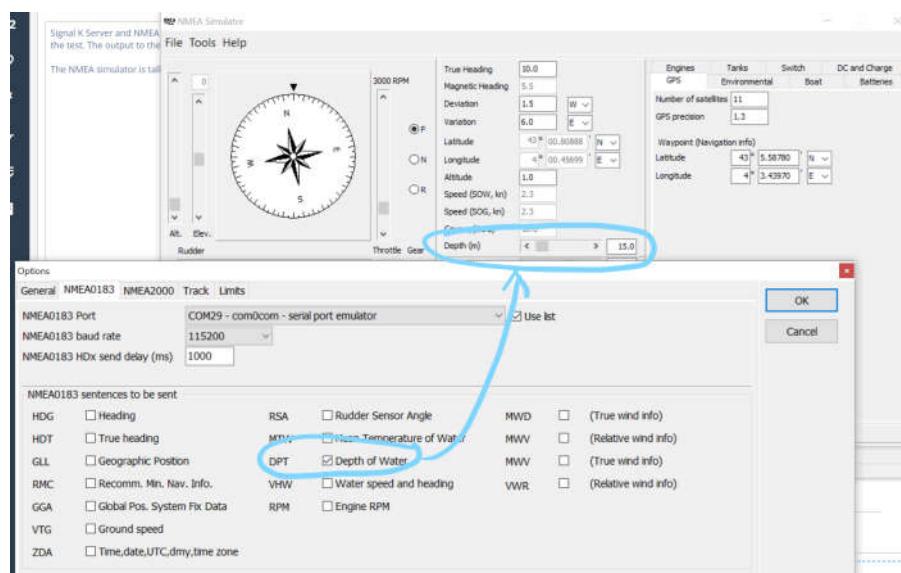
Stop the signalk-server. Wait until arrows moving from right to left do appear again, in five seconds. Observe all the instruments feeds, they should go to their empty values (but not navigation location which is coming from *O*). Start signalk-server again. Within a few seconds. the communication should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

displayed again.

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

2 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, which would result to, in <http://localhost:8375> like this

```
{"self":"urn:mrn:imo:mmsi:227346650","timestamp":"2019-09-14T16:12:22.413Z","version":"0.0.1"}  
{"updates":[{"source": {"sentence": "DPT", "talker": "SD", "type": "NMEA0183", "label": "Emu0183"}, "timestamp": "2019-09-14T16:12:22.443Z", "values": [{"path": "environment.depth.belowTransducer", "value": 15.3}]}], "context": "vessels.urn:mrn:imo:mmsi:227346650"}  
{"updates": [{"source": {"sentence": "DPT", "talker": "SD", "type": "NMEA0183", "label": "Emu0183"}, "timestamp": "2019-09-14T16:12:23.450Z", "values": [{"path": "environment.depth.belowTransducer", "value": 15.3}]}], "context": "vessels.urn:mrn:imo:mmsi:227346650"}
```

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.



Depth
15.3 m

* PASS or FAIL.



3

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, GNSS Fix and number of satellites are used, internally.

Development level test: PASS or FAIL

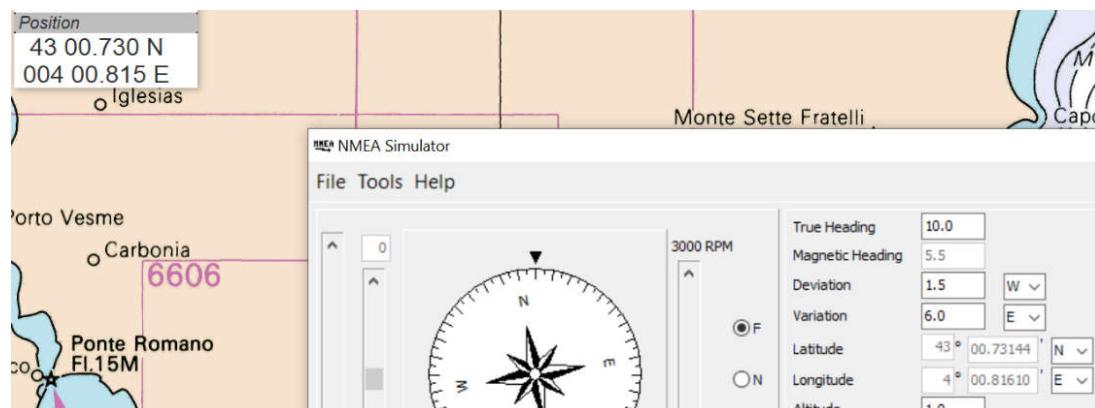
Due to priority selection, it is possible to test latitude and longitude changes only if one changes the in the source code the priority from the default level 3 to 1, which is the same in O given "fix" (which is actually the boat's position on the chart, not a GPS fix, necessarily). You would see some 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:

Position
 38 59.351 N
 009 13.206 E

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

4 !! 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.

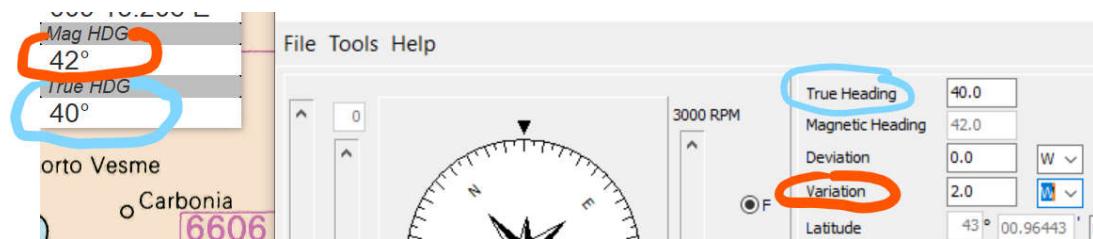


SKIP / PASS or FAIL

5 **!!** NMEA-0183 HDG

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

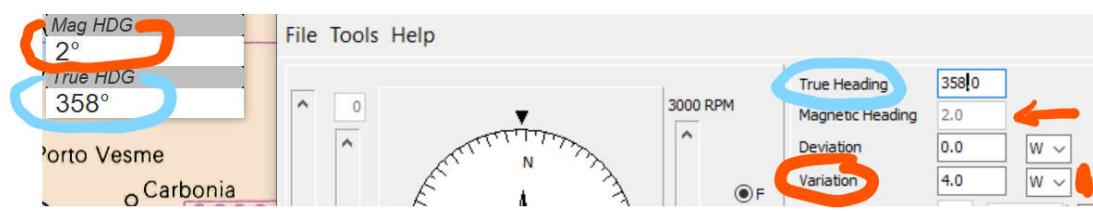
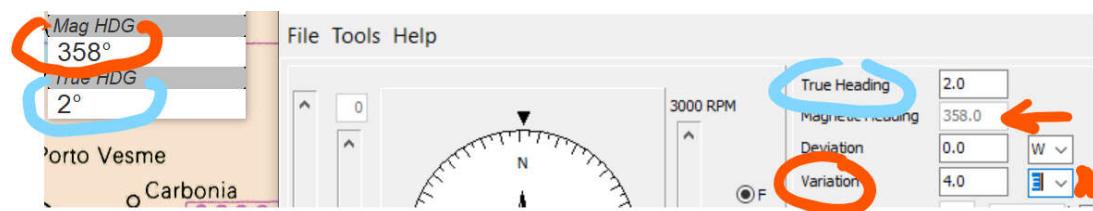
Check the following condition:



Change the variation to East:



Test the two use cases around the 360 degrees:



! All four tests PASS or any of them FAIL

6 **!!** 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

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

Input Type FileStream

Enabled

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:



With a browser on <http://localhost:8375> you should see this:

```
{"self":"urn:mrn:imo:mmsi:227346650","timestamp":"2019-09-15T20:13:46.084Z","version":"0.0.1"}  
{"updates":[{"source":{"sentence":"HDM","talker":"II","type":"NMEA0183","label":"cagliari"},"timestamp":"2019-09-15T20:13:46.101Z","values":[{"path":"navigation.headingMagnetic","value":4.502949471173527}]}],"context":{"vessels.urn:mrn:imo:mmsi:227346650"}}  
{"updates":[{"source":{"sentence":"HDM","talker":"II","type":"NMEA0183","label":"cagliari"},"timestamp":"2019-09-15T20:13:46.111Z","values":[{"path":"navigation.headingMagnetic","value":4.502949471173527}]}],"context":{"vessels.urn:mrn:imo:mmsi:227346650"}}
```

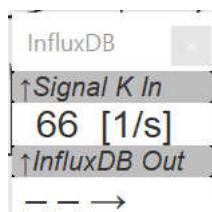
If your browser does not like the above, you should use wget(1) which stores the above in a file which you can inspect after a while.

Stop the browser window and 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.

Finally, verify that the number of sentences treated is matching also in the plug-in's instrument end (see above the rate on the Signal K server):

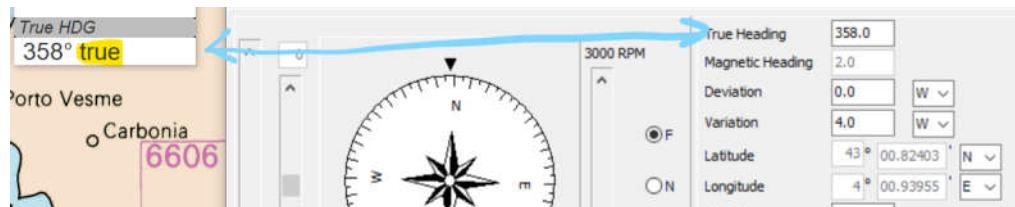


While streaming, verify that the user interface of **O** remains responsive and that its CPU load does not exceed 5 %. (with max 5 instruments defined)

PASS or FAIL

7 !! 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

8 !! 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

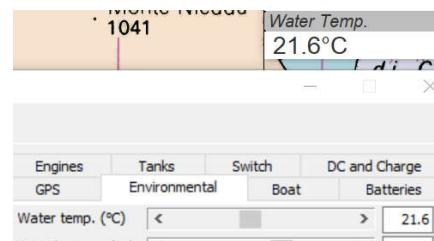
Observe also the delta update speed: in Signal K it is, for example 25 updates per second.

In Dashboard Tactics, the Signal K input connector shall indicate the double speed for data being sent out to be distributed to instruments (there are two values, the barometric pressure and the outside temperature value).

PASS or FAIL

9  **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

10  **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

11

!! 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

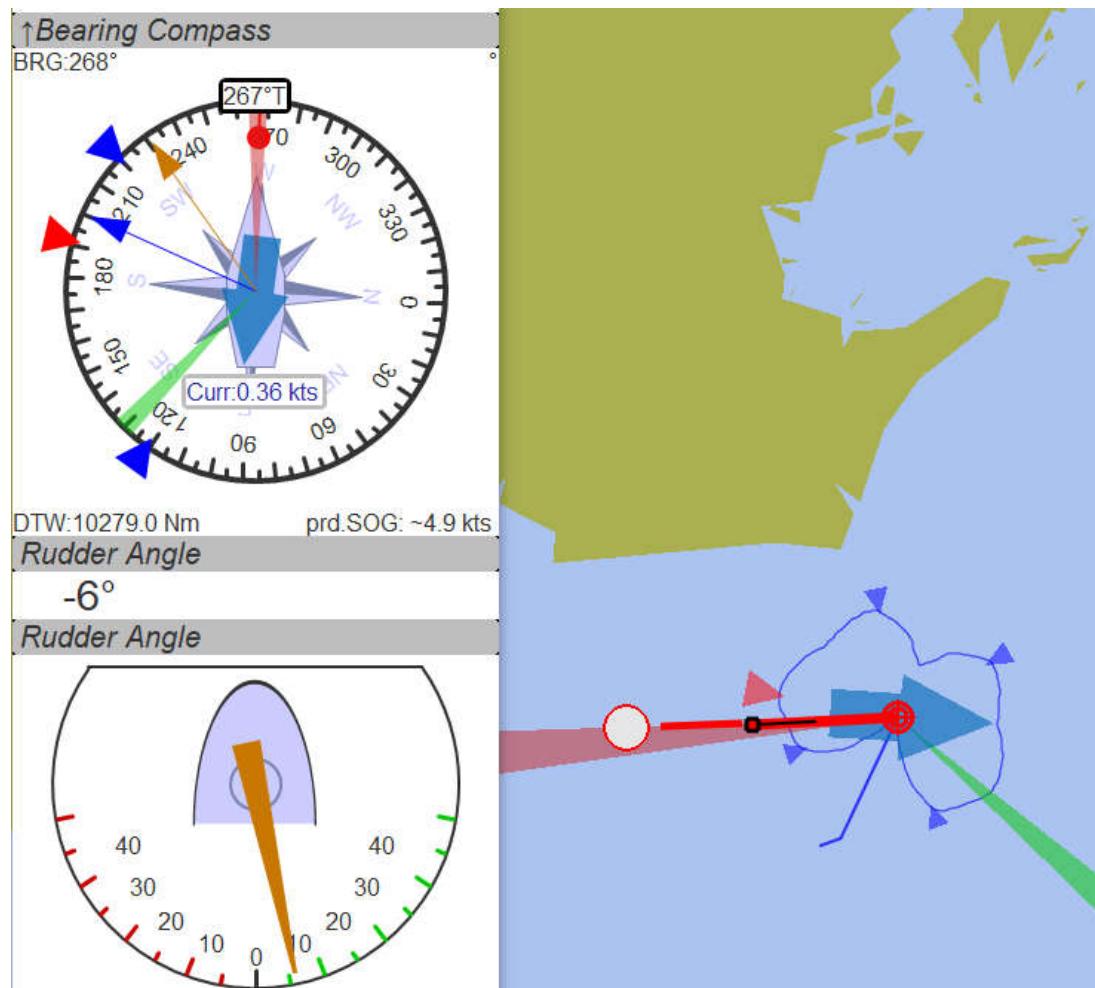
You should see VMG instrument values between 1 - 6 knots like this:

VMG
4.20 kts

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 required is the bearing obtained from the RMB. Using a polar file, one should get this type of display:



PASS or FAIL



12 !! 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.

13 !! 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.



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.

14 !! NMEA-0183 RSA

Test with the NMEA simulator:

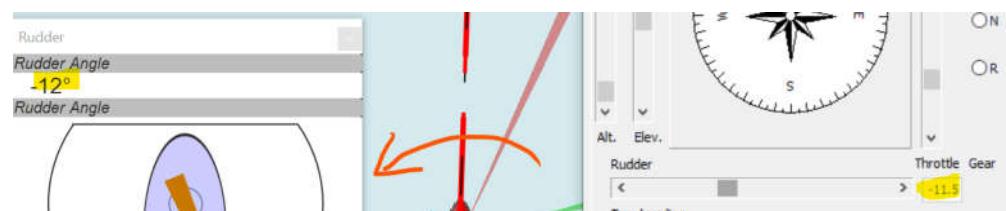
Test without Signal K node server - Dashboard NMEA-0183 parser as reference

Turn off Signal K node server you have been listening.

Note: Using this simulator, 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:

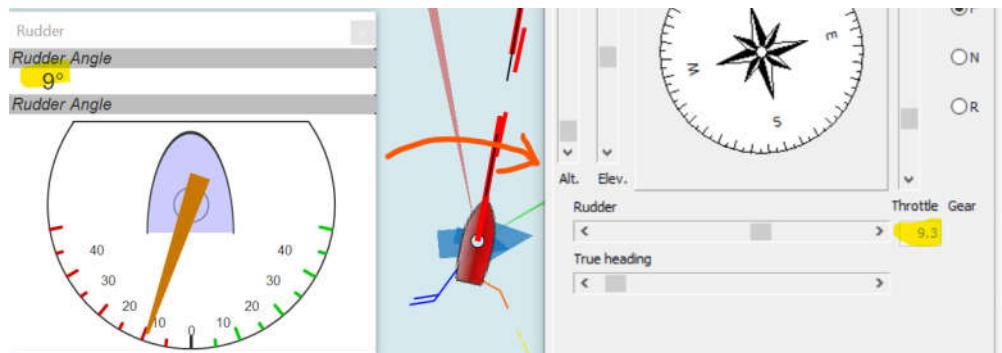
\$YDRSA,\$GPRSA1,\$GPRSA2,,V

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:



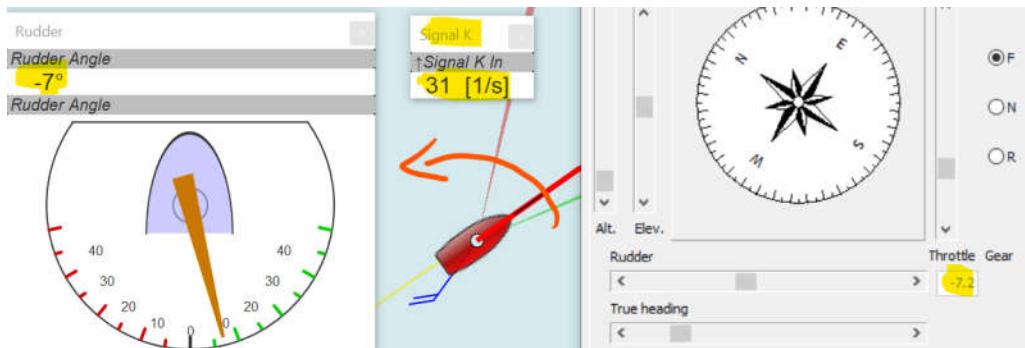
Test with Signal K node server

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.

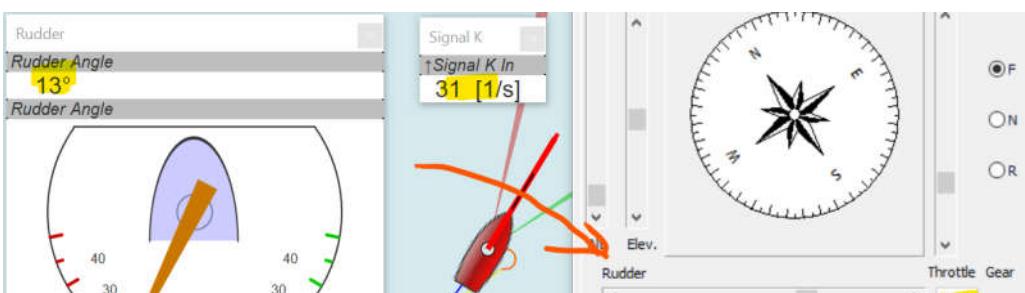
The input streamer interprets also the rudder angle from the emulators NMEA-0183 stream and sends it as Signal K data delta.

The purpose of this test is to verify that the displayed angles are consistent with the Dashboard's integrated NMEA-0183 parser.

Note: Signal K Node server does not need the extra rudder complying NMEA-0183 sentence as the Dashboard integrated NMEA-0183 parser does. Therefore you can use the simulator RSA signal with Signal K node server as it is. It comes well formed down to OpenCPN in both channels. If the NMEA Converter is enabled, disable it (not that it would have any effect to the below test but good practice requires that it is stopped).



X





Stop now the Signal K In streaming "instrument" (remove it). The operation returns now to the Dashboard integrated NMEA-0183 parser.

Repeat the test for the third time, now with the NMEA-0183 data which is coming from Signal K node server.

PASS or FAIL.

15 NMEA bypassing from OpenCPN



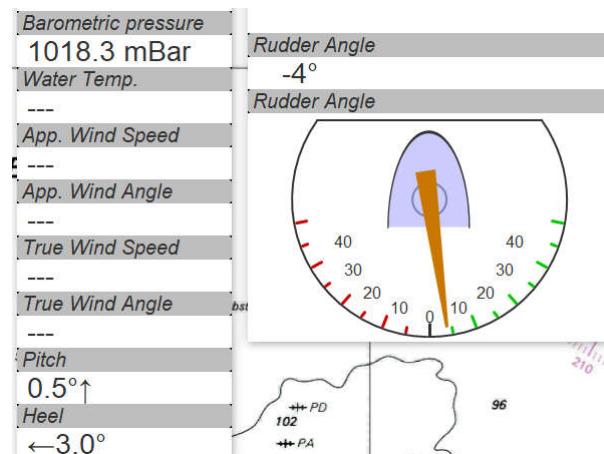
This test is to see that the alternative path from OpenCPN remains valid for the sentences which are available from Signal K as NMEA sentences to OpenCPN but which are not available as Signal K diff's converted from NMEA sentences in delta-channel (as JSON structures on a different socket).

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. Make the Signal K to repeat this XDR test file:

tc107_XDR.zip

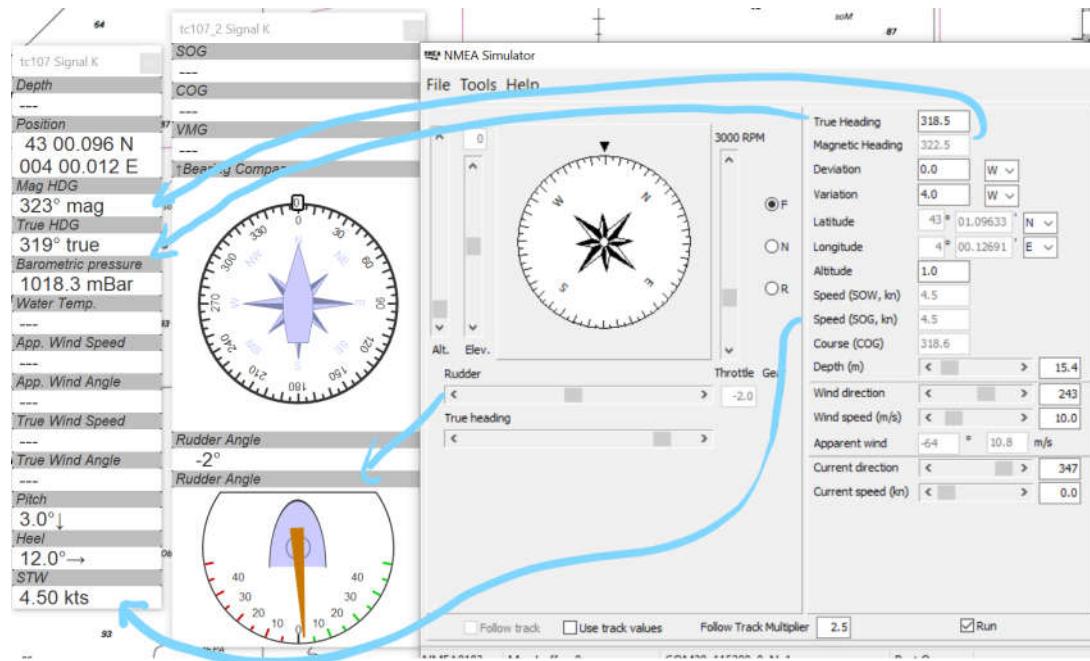
Have pitch, heel and barometric numerical instruments visible, on top of the RSA sentence simulator above. You should see all three XDR values moving along with the rudder indicator:



PASS or FAIL.

16 !! 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.

17 !! 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).

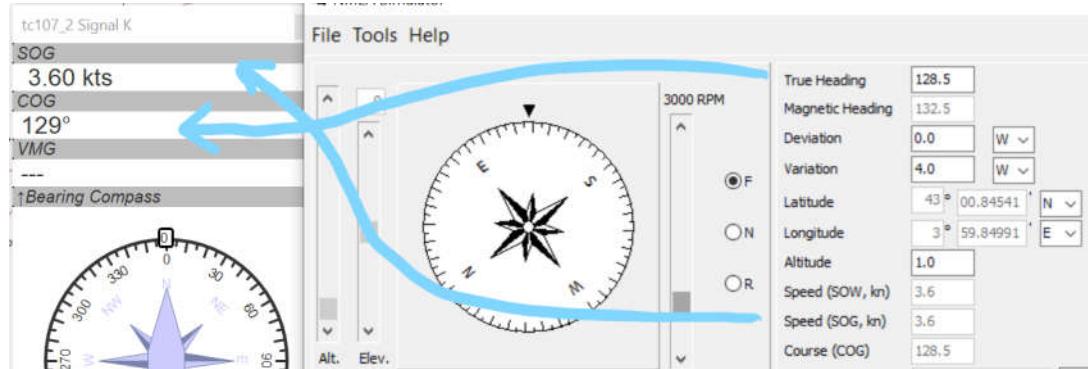
⌚ PASS or FAIL

18

!! 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

19

!! 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.

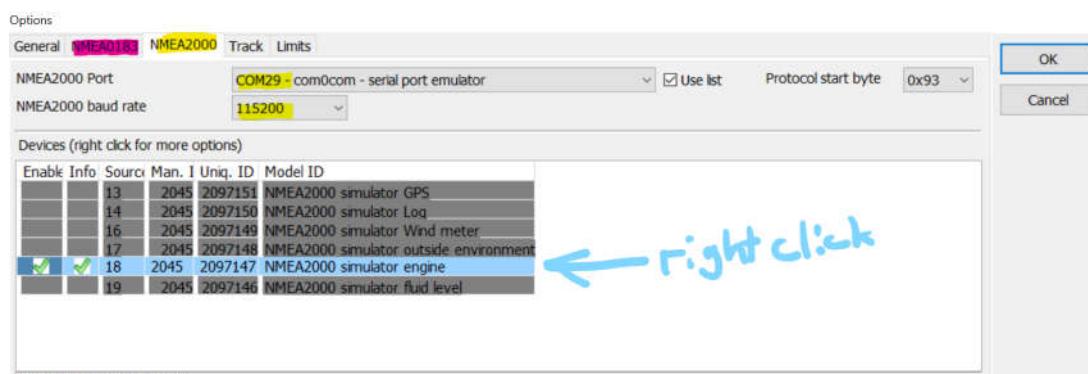


PASS or FAIL.

20

!! 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:



NMEA2000 Plans to be sent					
	Navigation	Wind, temp	Engine, other	Battery	Tanks
127488	18	2	0.10	<input checked="" type="checkbox"/> Main/port engine rapid	
127489	18	2	0.50	<input checked="" type="checkbox"/> Main/port engine dynamic	
127493	18	2	0.10	<input type="checkbox"/> Main/port transm. param.	
130312	18	5	2.00	<input type="checkbox"/> Eng. room temp.	
130316	18	5	2.00	<input type="checkbox"/> Eng. room temp ext.	
127245	18	2	0.10	<input type="checkbox"/> Rudder.	

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

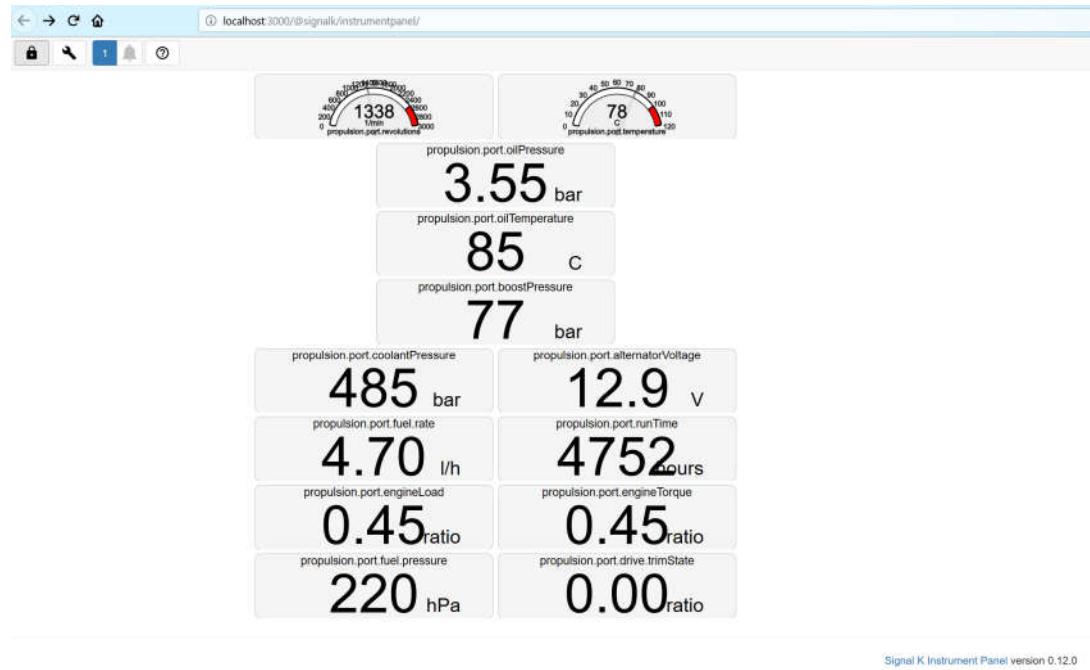
Input Type	NMEA2000
Enabled	<input checked="" type="checkbox"/>
Logging	<input checked="" type="checkbox"/>
ID	Emu2000
NMEA 2000 Source	Actisense NGT-1 (canboatjs)
Serial port	COM30
Baud Rate	115200
<input checked="" type="radio"/> Apply <input type="radio"/> Cancel	

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

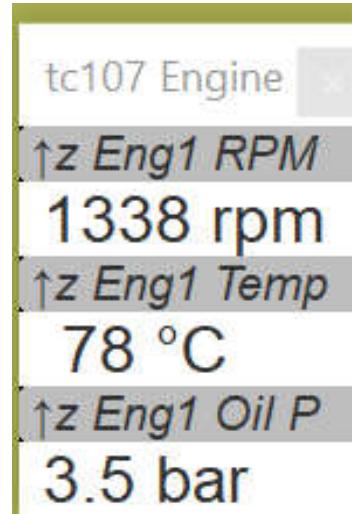
GPS		Environmental		Boat		Batteries	
Engines		Tanks		Switch		DC and Charge	
Main/port							
Main	Status	Transmission					
RPM	< >	1338					
Boost pressure (kPa)	< >	77.2					
Tilt/trim (%)	< >	0					
Oil pressure (kPa)	< >	355.0					
Oil temp (°C)	< >	85.0					
Engine temp (°C)	< >	78.0					
Altern. voltage	< >	12.9					
Fuel rate (l/h)	< >	10.5					
Engine hours (h)	< >	4737.3					
Coolant press. (kPa)	< >	48.5					
Fuel pressure (kPa)	< >	21.9					
Engine load (%)	< >	100					
Engine torque (%)	< >	100					
Eng. room temp. (°C)	< >	85.5					

Engine values depends on RPM

You can observe the above settings using the Signal K instrument panel plug-in on the browser:



Launch OpenCPN and add, in Tactics-part of the Dashboard-Tactics plugin the corresponding engine monitoring instruments and verify that you have the same results on three platforms:



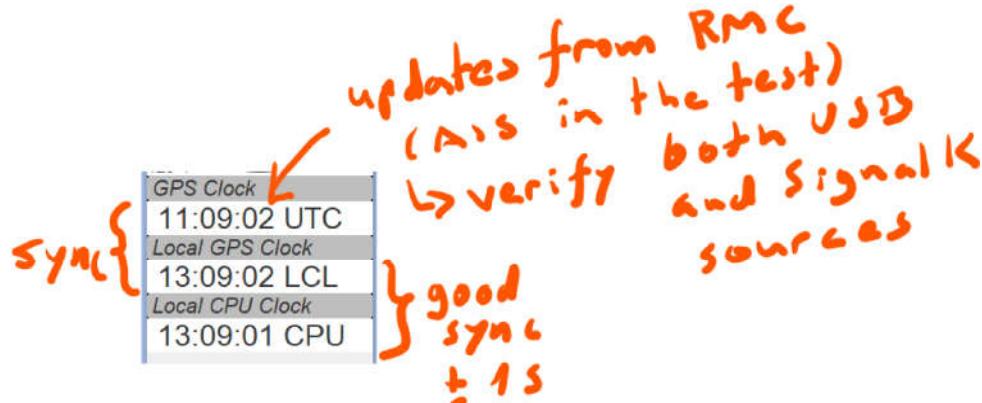
PASS or FAIL.



21

!! Maintaining the GPS clock source for "GPS" clock instruments: in this use case they get their date and time from RMC-sentence - this is available both from the O input NMEA parsing but also from Signal K delta containing navigation. -variables, including **navigation.datetime**, which is origin from the RMC-sentence. The objective is, at startup to observe that the UTC-time which is the internal plug-in's time, synchronized - among other sources - from RMC-sentence if it is available. Then the general 1 second tick distributes this time to clock-type of instruments.

Arrange the following instruments and stop / restart OpenCPN which is subscribed to Signal K delta stream. It contains also RMC-sentence originated data, if available. Observe that the transition is smooth and that the clock keeps on ticking every second.



It is normal that the Local CPU Clock is deviating a bit from the two GPS-set times. Strictly speaking, it is not even a CPU time but wxWidget's interpretation of the local time, which naturally depends of the operating system implementation - we check here only that it is not too much off (+/- 1s).



PASS or FAIL

+ Add Step

RESULTS	DEFECTS	REQUIREMENTS		
Status	Test Plan Run	Assigned To	Updated At↑	Actions
✓ Pass	TPR84 dashboard_tactics_pi_st...	Petri Makijarvi	2 months ago	<input type="checkbox"/>
✓ Pass	TPR83 dashboard_tactics_pi_si...	Petri Makijarvi	2 months ago	<input type="checkbox"/>
✓ Pass	TPR82 Signal K HDG sentence t...	Petri Makijarvi	2 months ago	<input type="checkbox"/>
✓ Pass	TPR81 dashboard_tactics_pi_st...	Petri Makijarvi	2 months ago	<input type="checkbox"/>
✓ Pass	TPR85 dashboard_tactics_pi_st...	Petri Makijarvi	29 days ago	<input type="checkbox"/>

ACTIVITY	HISTORY	COMMENTS	
TODAY			

 Petri Makijarvi Updated Step S273

less than a minute ago / Nov 18, 2019

 Petri Makijarvi Deleted Attachment AT161

3 minutes ago / Nov 18, 2019

 Petri Makijarvi Created Attachment AT

11 minutes ago / Nov 18, 2019

 Petri Makijarvi Created Attachment AT

16 minutes ago / Nov 18, 2019

 Petri Makijarvi Updated Step S273

38 minutes ago / Nov 18, 2019

