Changing NMEA2000 instances

1. Introduction

1.1 Purpose of NMEA 20000 instances

Instances are used in an NMEA2000 network to identify multiple similar products connected on the same network.

As an example, take a system with two battery monitors (one for the main battery bank, and another for the hydraulic-thruster bank) and also a Quattro inverter/charger. All three of those devices will send their battery voltage measurements out on the N2K network. For the displays to show these values at the right place, they need to know which voltage belongs to what battery. That is what instances are for.

1.2 Different types of instances

There various types of instances, and for marine systems are two that matter: the Device instance and the Data instance. Details and differences of each type are explained in detail in the Cerbo GX manual, NMEA 2000 chapter.

1.3 Recommend instancing setup for main MFD brands

Not all MFDs use instances the same. Some do not require setting up instances at all, others require to change the Device-instance and yet other brands require unique data instances or both.

Below documents explain the details for all major brands. Besides details on the required instancing; it also contains notes about supported, as well as non-supported, PGNs.

- NMEA 2000 configuration for Raymarine
- NMEA 2000 configuration for Garmin
- NMEA 2000 configuration for Furuno
- NMEA 2000 configuration for Navico (B&G, Simrad and Lowrance)

1.4 Different methods for setting up instances

As the NMEA2000 protocol prescribes commands to change an instance by sending commands to a device, there are various ways of changing instances. The purpose of this document is to describe all commonly used methods.

Besides the here described methods there are more, for example some MFDs allow changing instances as well.

1. GX Device: Device- instances only

2. Actisense software + NGT-1 USB: Device- as well as data-instances
3. Maretron software + USB adapter: Unknown
4. Commandline of a GX device: Device- as well as data-instances. Note that this required advanced Linux skills; and is listed here only for benefit of experienced software developers

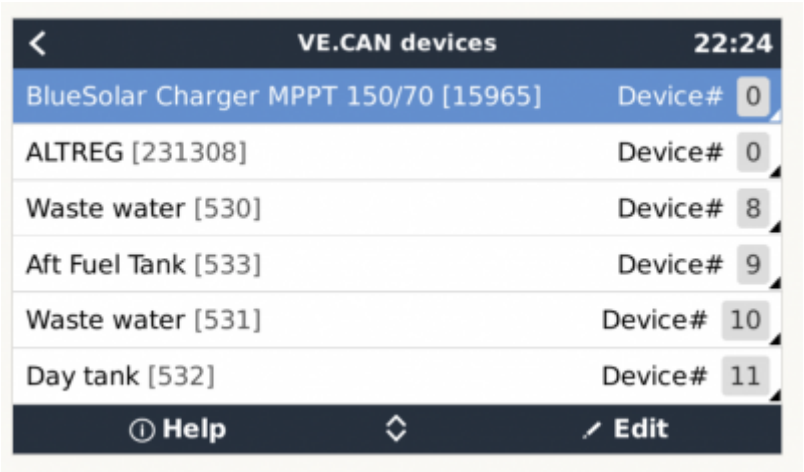
Chapter 2, 3, 4 and 5 explain these methods in detail.

1.5 Further reading on Victron and NMEA 2000

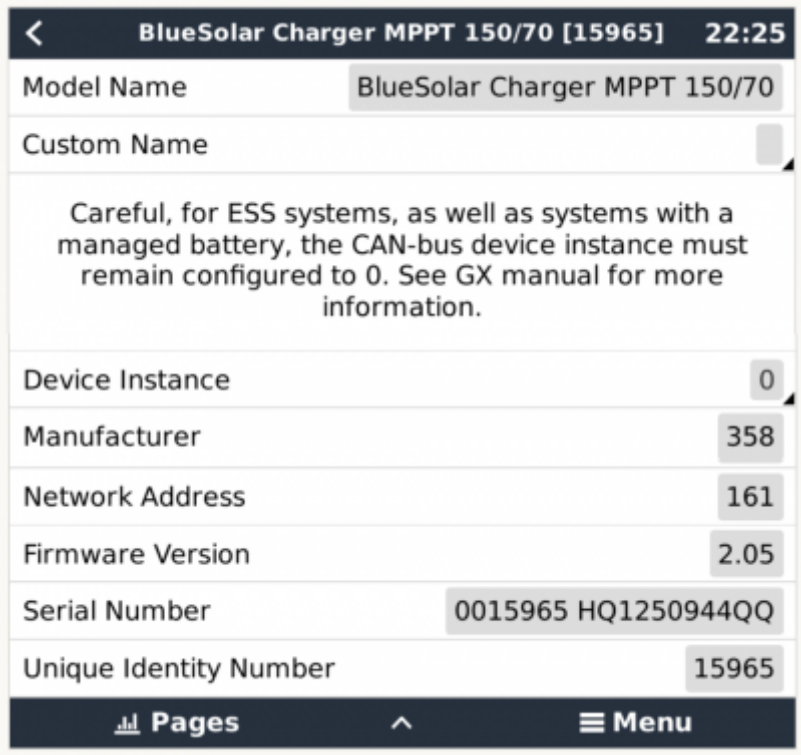
- NMEA 2000 & MFD integration guide
- Data communication white paper
- Cerbo GX manual, NMEA 2000 chapter
- NMEA2000 related discussions on Victron Community

2. GX Device: changing device instances

The Settings → Services → VE.Can → Devices menu shows a list of all devices on the N2K / VE.Can network:



By clicking the right button, a detailed menu is shown:



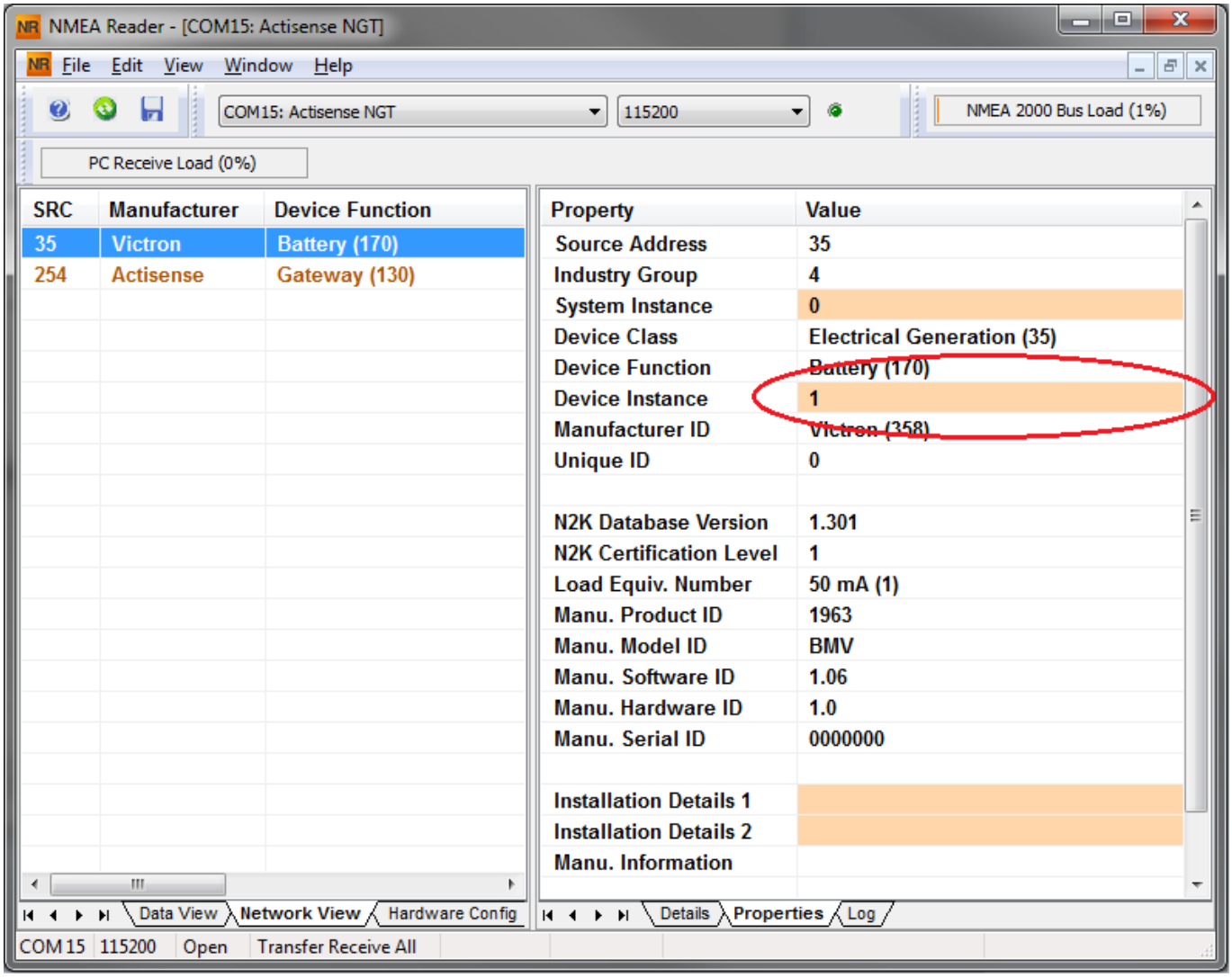
3. Actisense: changing device instances

Note: make sure to use a recent Actisense driver. Otherwise the instance might not ‘stick’.

Requires the Actisense NGT-1.

Changing a device instance:

1. Open Actisense NMEA Reader
2. Select the network view (tab selection is at the bottom left)
3. Select the product whose device instance you want to change
4. Select the properties tab at the bottom right and change the device instance

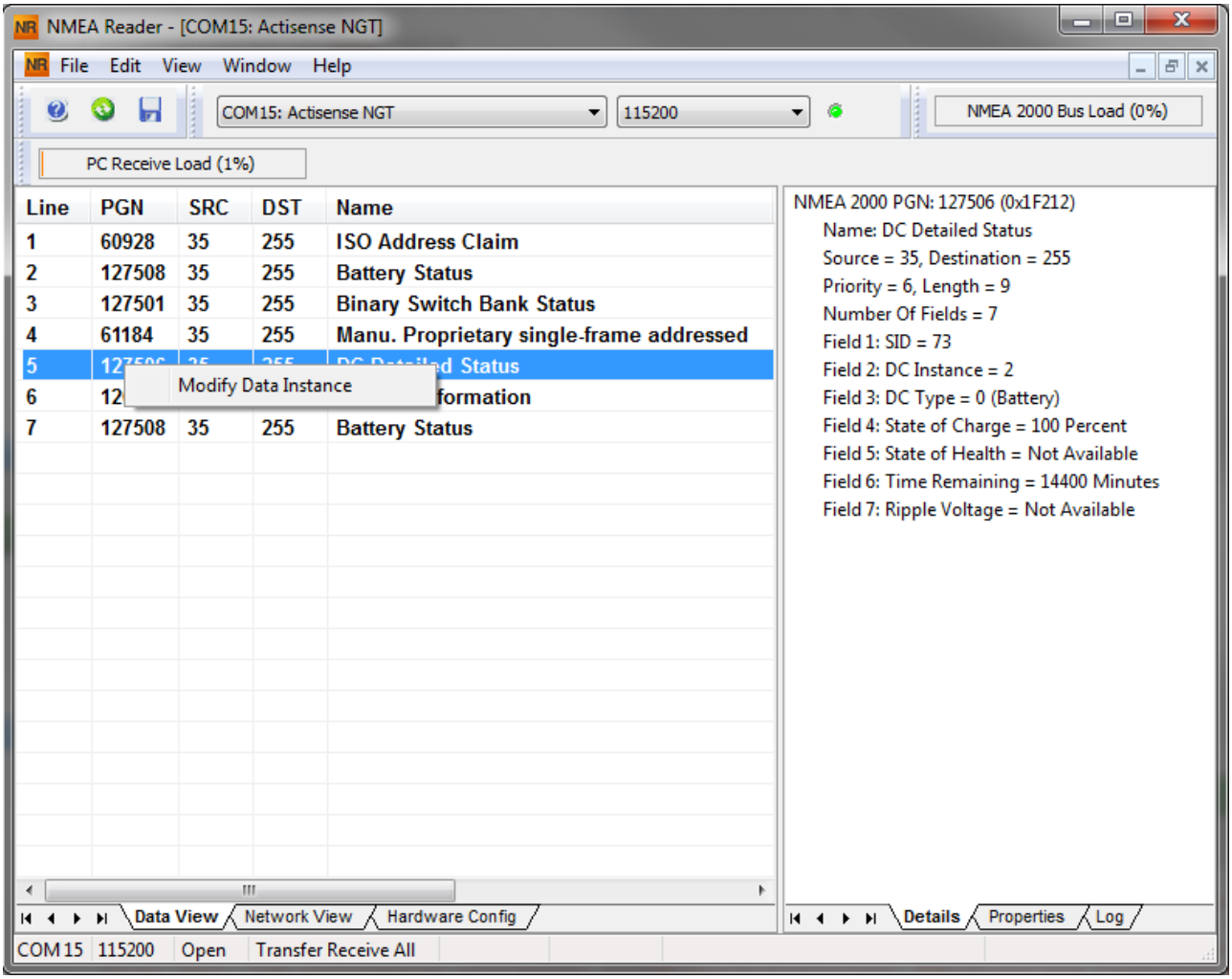


4. Actisense: changing data instances

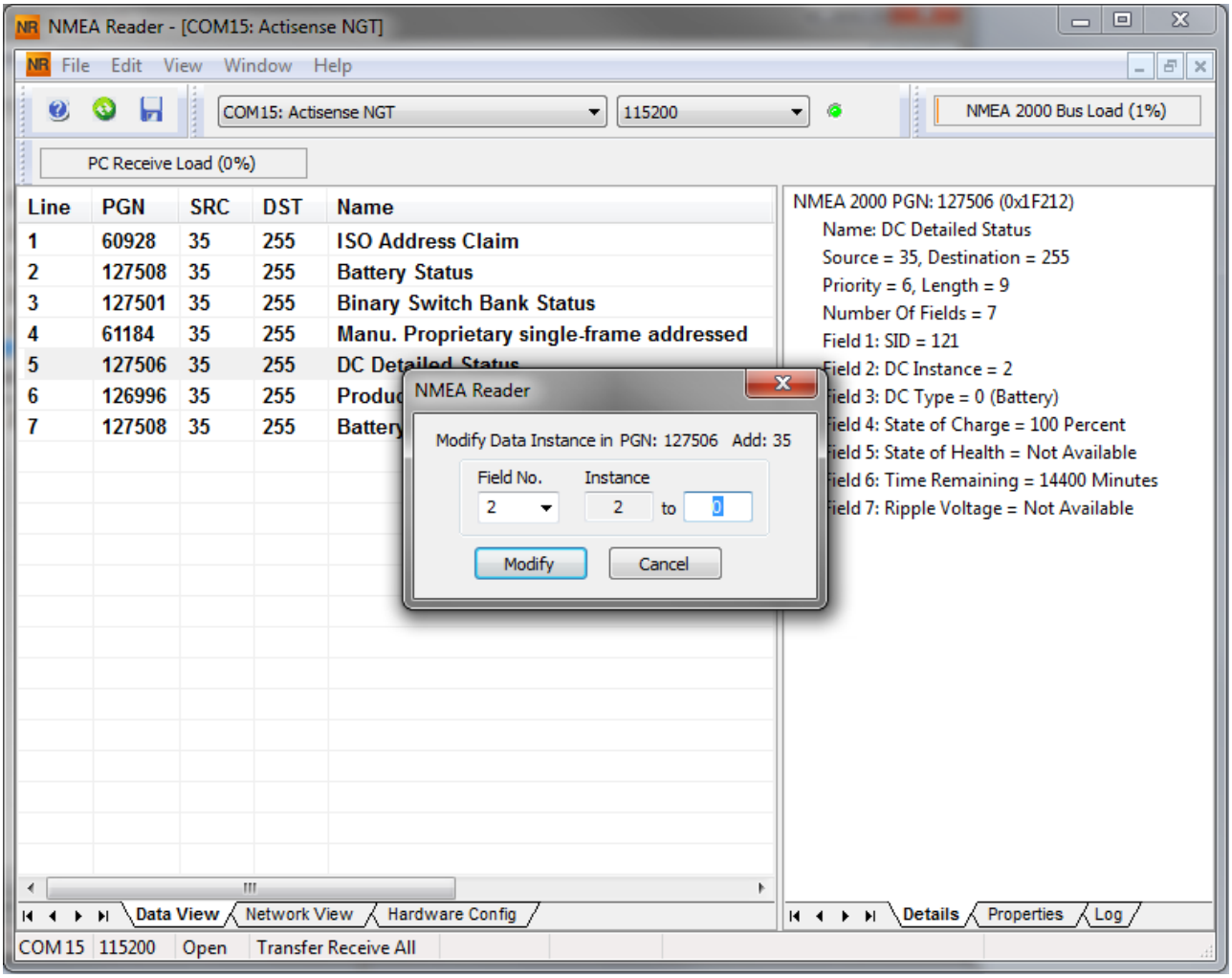
Requires the Actisense NGT-1.

Changing a data instance:

1. Open Actisense NMEA Reader
2. Select data view (tab selection is at the bottom left)
3. Right click on the PGN number. Note that this will only work on PGNs that allow changing their data instance:



4. And change the value:



Notes for BMVs, Lynx Shunt and the Lynx Ion + Shunt:

- The Battery Instance and the DC Detailed instance are the same value. Changing one of them, will also change the other one.
- Since the BMV sends out two voltages, the main voltage and the aux- or starter-voltage, it comes preconfigured with two battery instances: 0 and 1. When you want to change that to 1 and 2, change the 1 into 2 first, and then the 0 into 1, as they cannot be the same.

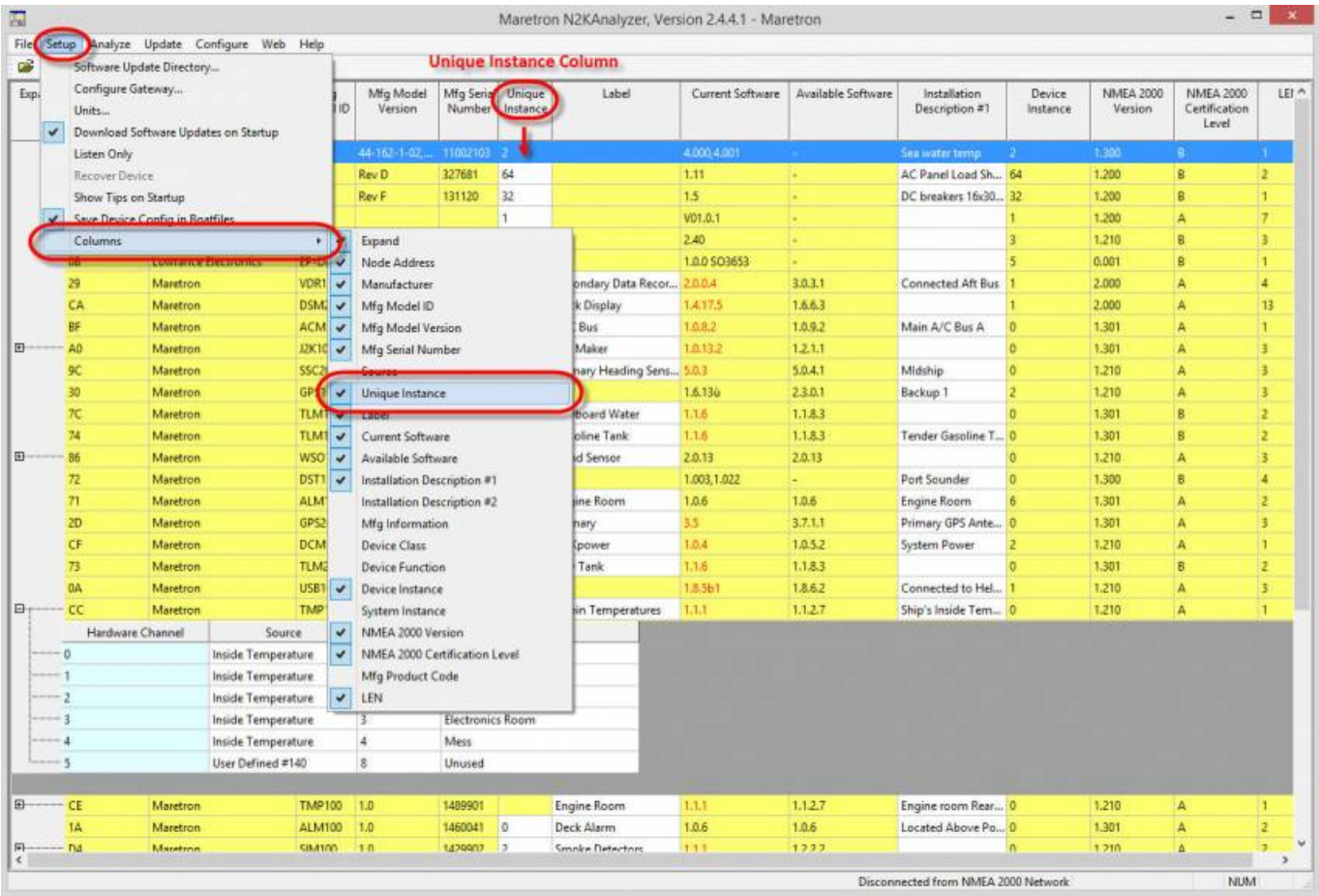
5. Maretron N2KAnalyzer

Maretron uses a term called “Unique Instance” where the N2KAnalyzer software tool automatically determines if a particular device uses device or data instances.

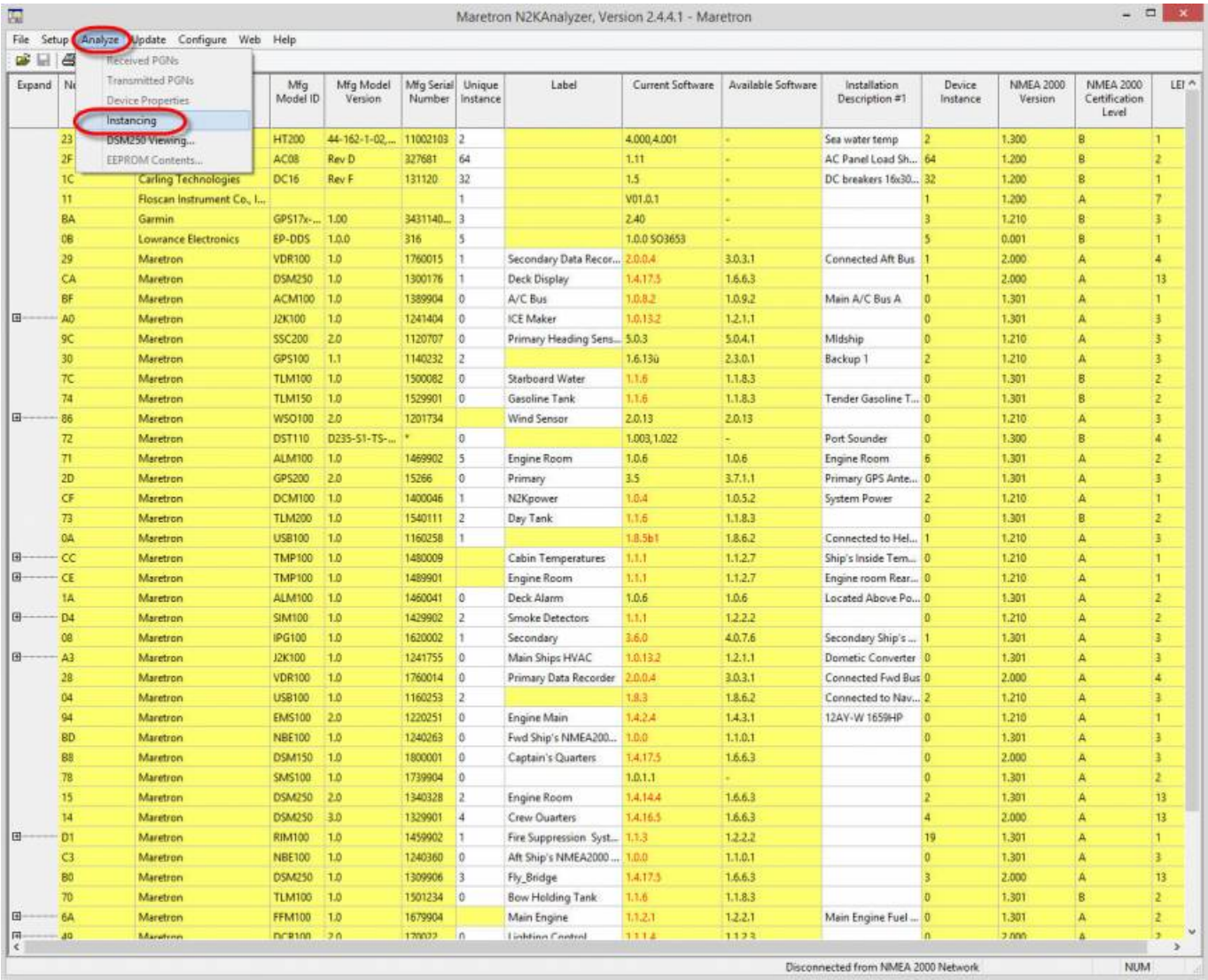
WARNING: At Victron we do not understand what and how the Maretron software works with regards to this. We advise to use another tool, not Maretron, so that you know what you are doing, ie know what instance you are changing. So far, we have not been able to use Maretron software to change a data instance. And changing the other instance, the device instance can also be done straight from the Victron GX device its user interface. To change a data instance, for example to fix instance conflicts as reported by the Maretron software, we recommend to use Actisense. Not Maretron.

This procedure requires a Maretron USB adapter.

Open N2KAnalyzer and make sure that the “Unique Instance” column is turned on (i.e. checked) using the Setup>Columns menu item.



Within the N2KAnalyzer main window, any cell with a white background can be edited by clicking in the cell and typing in the desired value. You can see from the following screen shot that a few parameters have a white background including Label and Installation Description #1. To change a devices instance, click in the Unique Instance cell for the device you want to change and type the new number followed by a carriage return. If the particular products accepts the instance change, you will see the new instance number reflected in the cell. You can also use a tool within N2KAnalyzer to check that all products on the network are uniquely instanced. Use the Analyze>Instancing menu to verify correct overall system instancing.



Expand	Ne		Mfg Model ID	Mfg Model Version	Mfg Serial Number	Unique Instance	Label	Current Software	Available Software	Installation Description #1	Device Instance	NMEA 2000 Version	NMEA 2000 Certification Level	LEI
	23		HT200	44-162-1-02,...	11002103	2		4.000,4.001	-	Sea water temp	2	1.300	B	1
	2F		AC08	Rev D	327681	64		1.11	-	AC Panel Load Sh...	64	1.200	B	2
	1C	Carling Technologies	DC16	Rev F	131120	32		1.5	-	DC breakers 16x30...	32	1.200	B	1
	11	Floscan Instrument Co., I...				1		V01.0.1	-		1	1.200	A	7
	BA	Garmin	GPS17x-...	1.00	3431140...	3		2.40	-		3	1.210	B	3
	0B	Lowrance Electronics	EP-DDS	1.0.0	316	5		1.0.0 SO3653	-		5	0.001	B	1
	29	Maretron	VDR100	1.0	1760015	1	Secondary Data Recor...	2.0.0.4	3.0.3.1	Connected Aft Bus	1	2.000	A	4
	CA	Maretron	DSM250	1.0	1300176	1	Deck Display	1.4.17.5	1.6.6.3		1	2.000	A	13
	BF	Maretron	ACM100	1.0	1389904	0	A/C Bus	1.0.8.2	1.0.9.2	Main A/C Bus A	0	1.301	A	1
⊞	A0	Maretron	J2K100	1.0	1241404	0	ICE Maker	1.0.13.2	1.2.1.1		0	1.301	A	3
	9C	Maretron	SSC200	2.0	1120707	0	Primary Heading Sens...	5.0.3	5.0.4.1	Midship	0	1.210	A	3
	30	Maretron	GPS100	1.1	1140232	2		1.6.13ü	2.3.0.1	Backup 1	2	1.210	A	3
	7C	Maretron	TLM100	1.0	1500082	0	Starboard Water	1.1.6	1.1.8.3		0	1.301	B	2
	74	Maretron	TLM150	1.0	1529901	0	Gasoline Tank	1.1.6	1.1.8.3	Tender Gasoline T...	0	1.301	B	2
⊞	86	Maretron	WSO100	2.0	1201734		Wind Sensor	2.0.13	2.0.13		0	1.210	A	3
	72	Maretron	DST110	D235-S1-TS-...	*	0		1.003,1.022	-	Port Sounder	0	1.300	B	4
	71	Maretron	ALM100	1.0	1469902	5	Engine Room	1.0.6	1.0.6	Engine Room	6	1.301	A	2
	2D	Maretron	GPS200	2.0	15266	0	Primary	3.5	3.7.1.1	Primary GPS Ante...	0	1.301	A	3
	CF	Maretron	DCM100	1.0	1400046	1	N2Kpower	1.0.4	1.0.5.2	System Power	2	1.210	A	1
	73	Maretron	TLM200	1.0	1540111	2	Day Tank	1.1.6	1.1.8.3		0	1.301	B	2
	0A	Maretron	USB100	1.0	1160258	1		1.8.5b1	1.8.6.2	Connected to Hel...	1	1.210	A	3
⊞	CC	Maretron	TMP100	1.0	1480009		Cabin Temperatures	1.1.1	1.1.2.7	Ship's Inside Tem...	0	1.210	A	1
⊞	CE	Maretron	TMP100	1.0	1489901		Engine Room	1.1.1	1.1.2.7	Engine room Rear...	0	1.210	A	1
	1A	Maretron	ALM100	1.0	1460041	0	Deck Alarm	1.0.6	1.0.6	Located Above Po...	0	1.301	A	2
⊞	D4	Maretron	SIM100	1.0	1429902	2	Smoke Detectors	1.1.1	1.2.2.2		0	1.210	A	2
	08	Maretron	IPG100	1.0	1620002	1	Secondary	3.6.0	4.0.7.6	Secondary Ship's ...	1	1.301	A	3
⊞	A3	Maretron	J2K100	1.0	1241755	0	Main Ships HVAC	1.0.13.2	1.2.1.1	Dometic Converter	0	1.301	A	3
	28	Maretron	VDR100	1.0	1760014	0	Primary Data Recorder	2.0.0.4	3.0.3.1	Connected Fwd Bus	0	2.000	A	4
	04	Maretron	USB100	1.0	1160253	2		1.8.3	1.8.6.2	Connected to Nav...	2	1.210	A	3
	94	Maretron	EMS100	2.0	1220251	0	Engine Main	1.4.2.4	1.4.3.1	12AY-W 1659HP	0	1.210	A	1
	BD	Maretron	NBE100	1.0	1240263	0	Fwd Ship's NMEA200...	1.0.0	1.1.0.1		0	1.301	A	3
	B8	Maretron	DSM150	1.0	1800001	0	Captain's Quarters	1.4.17.5	1.6.6.3		0	2.000	A	3
	78	Maretron	SMS100	1.0	1739904	0		1.0.1.1	-		0	1.301	A	2
	15	Maretron	DSM250	2.0	1340328	2	Engine Room	1.4.14.4	1.6.6.3		2	1.301	A	13
	14	Maretron	DSM250	3.0	1329901	4	Crew Quarters	1.4.16.5	1.6.6.3		4	2.000	A	13
⊞	D1	Maretron	RIM100	1.0	1459902	1	Fire Suppression Syst...	1.1.3	1.2.2.2		19	1.301	A	1
	C3	Maretron	NBE100	1.0	1240360	0	Aft Ship's NMEA2000 ...	1.0.0	1.1.0.1		0	1.301	A	3
	B0	Maretron	DSM250	1.0	1309906	3	Fly_Bridge	1.4.17.5	1.6.6.3		3	2.000	A	13
	70	Maretron	TLM100	1.0	1501234	0	Bow Holding Tank	1.1.6	1.1.8.3		0	1.301	B	2
⊞	6A	Maretron	FFM100	1.0	1679904		Main Engine	1.1.2.1	1.2.2.1	Main Engine Fuel ...	0	1.301	A	2
⊞	49	Maretron	DCR100	2.0	139032	0	Lighting Control	1.1.1.4	1.1.2.3		0	2.000	A	2

6. Changing the instances from the GX command line

6.1 Introduction

Instead of using Actisense or Maretron software, it is also possible to change the VE.Can aka N2K Device instance from the GX Device shell. To get root access, follow these instructions: Venus OS: Root Access.

Once logged into the shell, follow below instructions. More back ground information of the used commands such as dbus and dbus-spy is found by reading about root access document.

6.1 New method - changing a Device instance

All devices available on the canbus are enumerated under the com.victronenergy.vecan service. And for all devices that support the necessary can-bus commands, the Device instance can be changed. All Victron products support changing their Device instance; and most or all non-Victron products as

well.

```
# dbus -y com.victronenergy.vecan.can0 / GetValue
value = {
 'Devices/00002CC001F4/DeviceInstance': 0,
 'Devices/00002CC001F4/FirmwareVersion': 'v2.60-beta-29',
 'Devices/00002CC001F4/Manufacturer': 358,
 'Devices/00002CC001F4/ModelName': 'Cerbo GX',
 'Devices/00002CC001F4/N2kUniqueNumber': 500,
 'Devices/00002CC001F4/Nad': 149,
 'Devices/00002CC001F4/Serial': '0000500',
 'Devices/00002CC005EA/CustomName': 'Hub-1',
 'Devices/00002CC005EA/DeviceInstance': 0,
 'Devices/00002CC005EA/FirmwareVersion': 'v2.60-beta-29',
 'Devices/00002CC005EA/Manufacturer': 358,
 'Devices/00002CC005EA/ModelName': 'Color Control GX',
 'Devices/00002CC005EA/N2kUniqueNumber': 1514,
 'Devices/00002CC005EA/Nad': 11,
 'Devices/00002CC005EA/Serial': '0001514',
 'Devices/00002CC005EB/CustomName': 'SmartBMV',
 [and so forth]
```

To change them, do a SetValue call to the DeviceInstace path like below. Or, perhaps easier, use the dbus-spy tool.

These lines read it, then changes it to 1, then reads it again:

```
root@ccgx:~# dbus -y com.victronenergy.vecan.can0
/Devices/00002CC005EB/DeviceInstance GetValue
value = 0
root@ccgx:~# dbus -y com.victronenergy.vecan.can0
/Devices/00002CC005EB/DeviceInstance SetValue %1
retval = 0
root@ccgx:~# dbus -y com.victronenergy.vecan.can0
/Devices/00002CC005EB/DeviceInstance GetValue
value = 1

[note that numbers, like can0, and 00002CC005EB can ofcourse be different on
your system].
```

6.2 New method - changing Data instance

This applies only the NMEA2000-out feature. See links on top of page for what the NMEA2000 out feature is.

The data instances used for the NMEA2000 out feature are stored in local settings. Here is a snippet of the lines, taken by using the dbus-spy tool that also allows changing entries:

The Data instances are the “Battery-”, “DCDetailed-”, and so forth instances.

```
Settings/Vecan/can0/Forward/battery/256/BatteryInstance0       0      <-
Data instance for main voltage measurement
Settings/Vecan/can0/Forward/battery/256/BatteryInstance1       1      <-
Data instance for starter or mid-voltage measurement
Settings/Vecan/can0/Forward/battery/256/Description2
Settings/Vecan/can0/Forward/battery/256/IdentityNumber        15
Settings/Vecan/can0/Forward/battery/256/Instance               1
Settings/Vecan/can0/Forward/battery/256/Nad                  233      <-
Source address - no need, also not good, to change this
Settings/Vecan/can0/Forward/battery/256/SwitchInstance1        0      <-
Data instance for switchbank
Settings/Vecan/can0/Forward/battery/256/SystemInstance         0
Settings/Vecan/can0/Forward/solarcharger/0/DcDataInstance0     0
Settings/Vecan/can0/Forward/solarcharger/0/DcDataInstance1     1
Settings/Vecan/can0/Forward/solarcharger/0/Description2
Settings/Vecan/can0/Forward/solarcharger/0/IdentityNumber     25
Settings/Vecan/can0/Forward/solarcharger/0/Instance            0
Settings/Vecan/can0/Forward/solarcharger/0/Nad                36
Settings/Vecan/can0/Forward/solarcharger/0/SystemInsta         0
Settings/Vecan/can0/Forward/solarcharger/1/DcDataInstance0     0      <-
Battery voltage & current
Settings/Vecan/can0/Forward/solarcharger/1/DcDataInstance1     1      <- PV
voltage & current
Settings/Vecan/can0/Forward/solarcharger/1/Description2
Settings/Vecan/can0/Forward/solarcharger/1/IdentityNumber     24
Settings/Vecan/can0/Forward/solarcharger/1/Instance            0
Settings/Vecan/can0/Forward/solarcharger/1/Nad                36
Settings/Vecan/can0/Forward/solarcharger/1/SystemInstance      0
Settings/Vecan/can0/Forward/solarcharger/258/DcDataInstance0   0
Settings/Vecan/can0/Forward/solarcharger/258/DcDataInstance1   1
Settings/Vecan/can0/Forward/solarcharger/258/Description2
Settings/Vecan/can0/Forward/solarcharger/258/IdentityNumber   23
Settings/Vecan/can0/Forward/solarcharger/258/Instance          0
Settings/Vecan/can0/Forward/solarcharger/258/Nad              36
Settings/Vecan/can0/Forward/solarcharger/258/SystemInstance    0
```

6.3 Old method

(Only allows changing Device instances - not data instances as used in the NMEA2000-out function)

Step 1. List the devices:

```
root@ccgx:~# dbus -y
com.victronenergy.bms.socketcan_can0_di0_uc10
com.victronenergy.charger.socketcan_can0_di1_uc12983
```

It shows a Skylla-i (the charger). di1 in the name means that it is currently on DeviceInstance 1.

Step 2. Change it, for example, to 4:

```
root@ccgx:~# dbus -y com.victronenergy.charger.socketcan_can0_di0_uc12983
/DeviceInstance SetValue %4
retval = 0
```

Step 3. Wait a few seconds, and double check:

```
root@ccgx:~# dbus -y
com.victronenergy.bms.socketcan_can0_di0_uc10
com.victronenergy.charger.socketcan_can0_di4_uc12983
```

Device instance changed successful!