



Calero

Electronic Navigation Equipment
Upgrade

August 2009

Change History

20/03/07	V 0.11	Reallocate power distribution
20/03/07	V 0.12	Detail wiring for NMEA Junction Box
24/03/07	V 0.13	Corrections to NMEA Junction Box colours Updated NMEA Mux Power Distribution to include indirect supplies Detail Wiring for Seataalk RS232 Box Remove PC from Seataalk RS232 Box (only required for Raytech Navigation software) Gyro output 10Hz at 4800 baud AIS will be fed into Port 1 of the NMEA Mux (Gyro to Port 2) to ensure high speed NMEA output to the Garmin 3005C
19/04/07	V 0.14	Include DIN Socket (at Navigation Table) connection to NMEA Mux output GPSMAP 3005C connected to "GPS" power at the distribution panel Re do GPSMAP 3005C Wiring to accomodate restriction of GPS NMEA Source being input to Port 3
28/06/07	V0.15	Edited to show final configuration (for now!)
11/02/2008	V0.16	Update to reflect dual Garmin Chartplotter Configuration
		Installation of Engine Hour Meter
01/03/08	V0.17	Complete revamp following problems interfacing the Raymarine GPS to networked Garmin plotters. GPS 17HVS is now the GPS source.
	V0.18/V0.19	Make adjustments to reflect current wiring.
	V0.20	Reconfigure NMEA Junction Box
	V0.21	Adjustments to NMEA wiring and the DIN connection
12/03/08	V0.22	Change GPS feed to the RN300 to prevent No Fix conflict with Seataalk
01/04/08	V0.23	Readjust Power distribution to allow low power operation
01/04/09	V0.24	Add NMEA Buffer to resolve problems with loss of GPS signal
01/08/09	V0.25	Upgrade 3005C to 3010C – modify port connections (3010C has an additional port) and upgrade fuse. Remove NMEA GPS feed to the RN300 – GPS will feed via the Seataalk RS232 box

Key Components

Garmin Marine Network

- Garmin GMR18 Radar (4kw Radar, MARPA)
- Garmin GPSMAP 3205 Radar Display and Chartplotter (at binnacle)
- Garmin GPSMAP 3010C Radar Display and Chartplotter (at navigation table)
- Garmin GMS 10 Network Port Expander

Raymarine Seataalk

- Raymarine RN300 plotter as Seataalk Repeater
- Raymarine ST60 (Wind, Depth and Speed)
- Raymarine 5000plus Autopilot
- Raymarine PC/Seataalk/NMEA Interface Box

KVH

- KVH Autocomp 1000S Fast Heading Sensor

Radio/VHF

- Simrad RD68 GMDSS DSC VHF Radio
- Pioneer LW/MW/FM CD Player with Ipod/MP3/WMA
- EasyAIS (2 Channel Receiver)
- EasyAIS Aerial Splitter

NASA

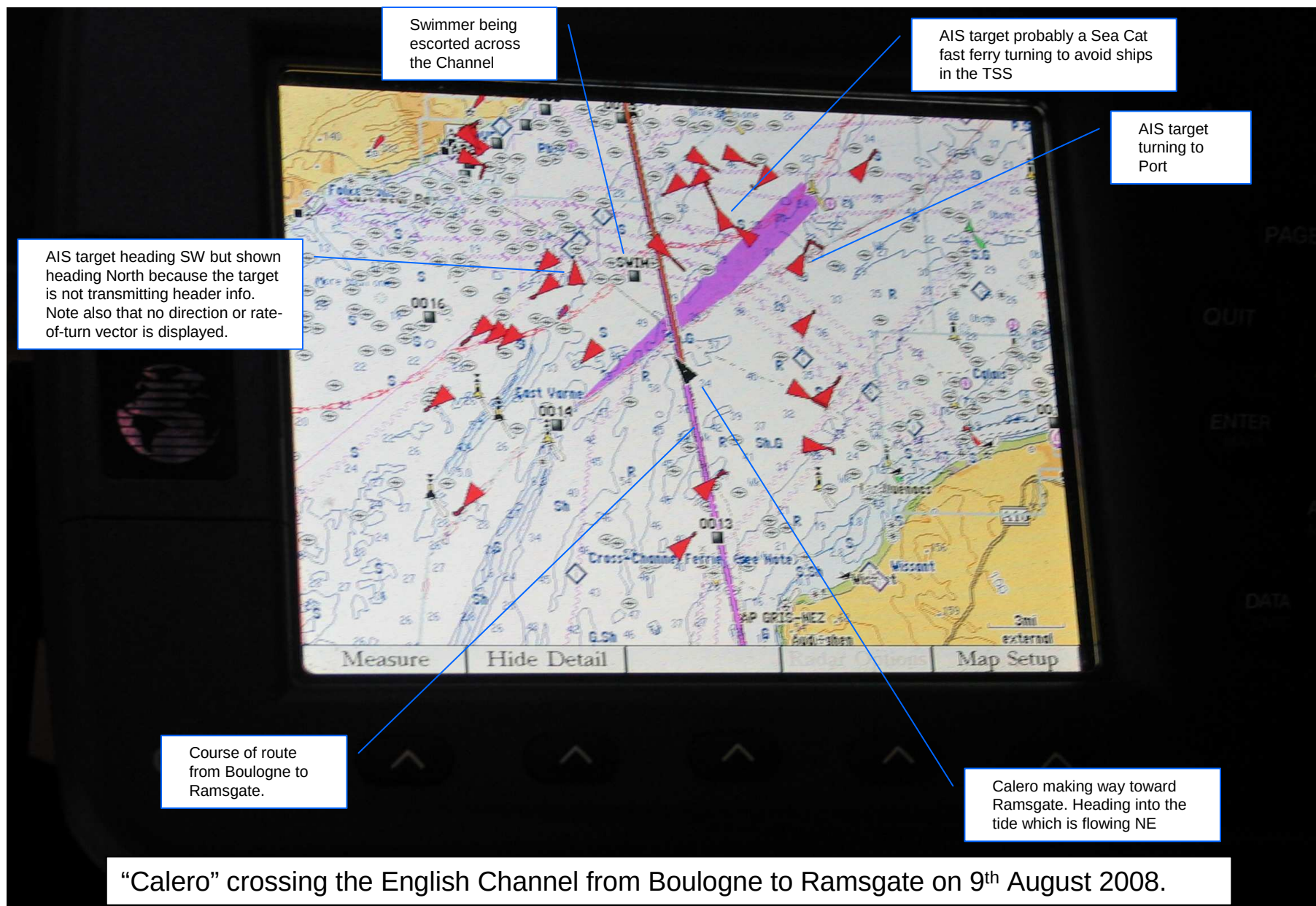
- NASA PC Navtex PRO

Actisense

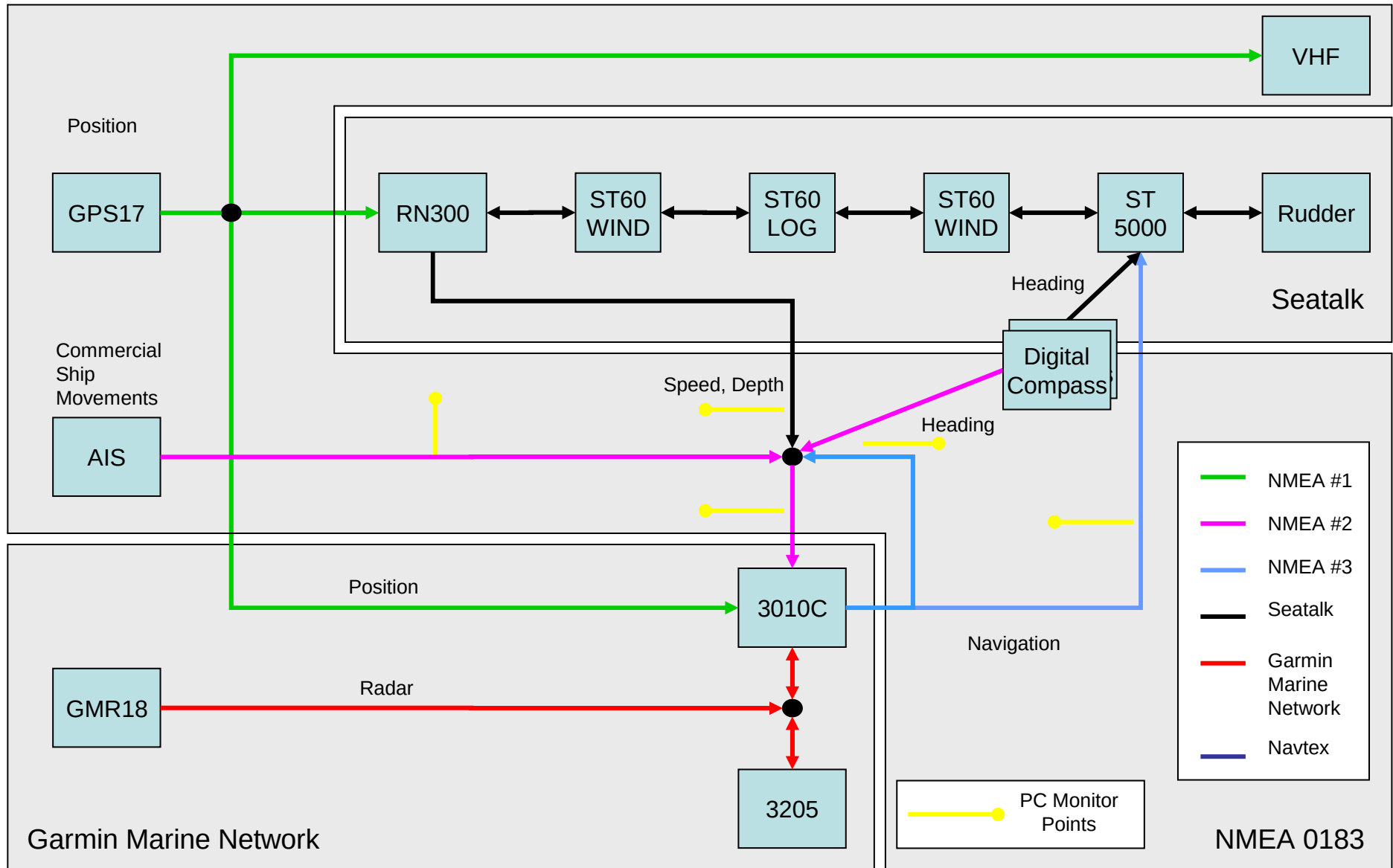
- Actisense NDC-2-C NMEA Data Combiner
- Actisense NBF-2 NMEA Buffer



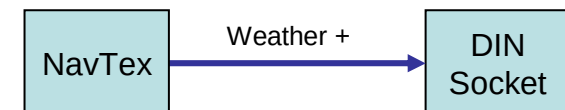
Version 25 01/08/09



Network Interconnectivity



Version 25 01/08/09



Network Interconnectivity

The diagram illustrates the interconnection of various electronic components to a central **Seataalk** backbone. The components and their connections are as follows:

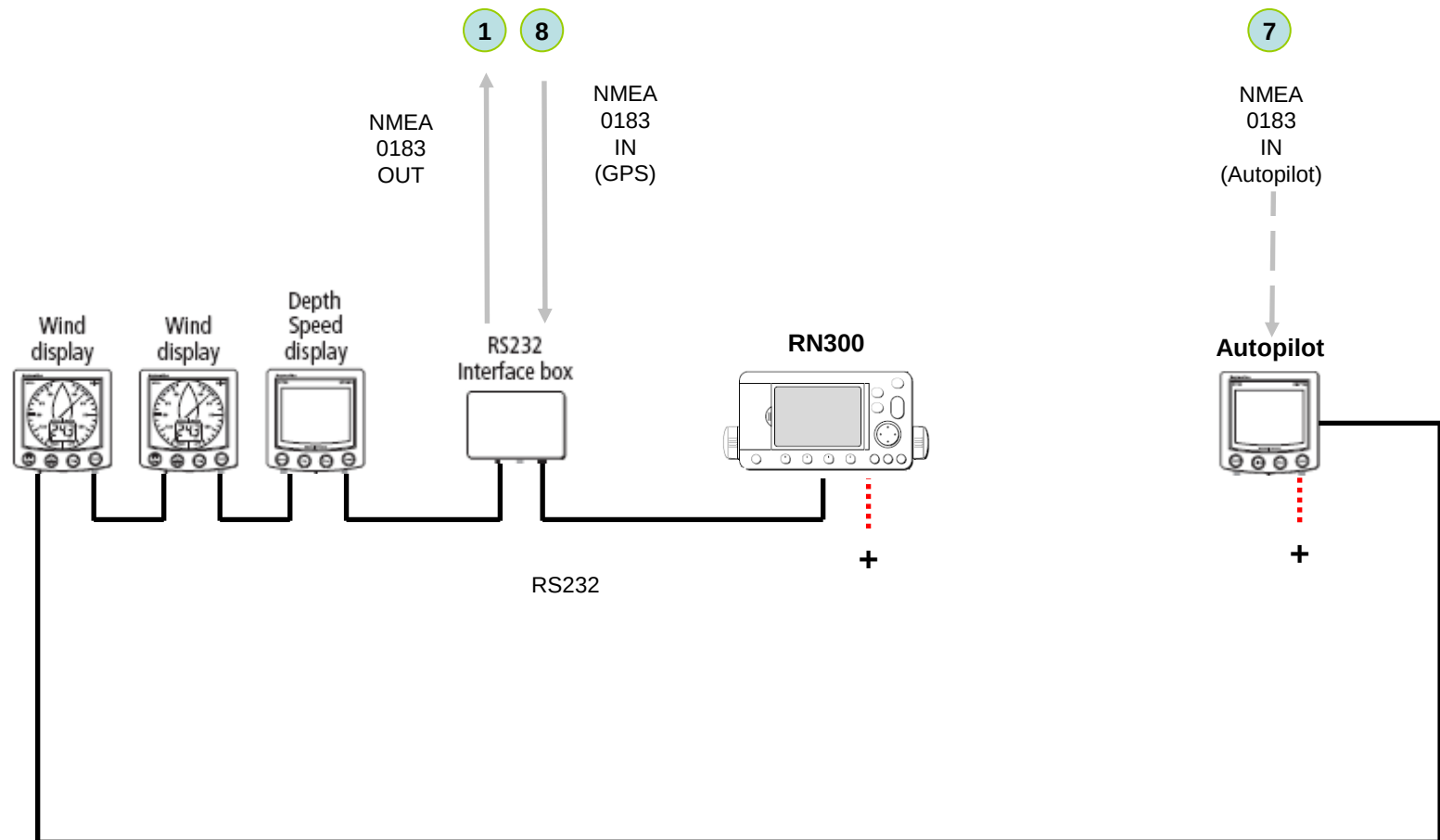
- PC**: Connected to the backbone via a blue line.
- NAVTEX** (NASA Navtex Pro): Connected to the backbone via a blue line.
- VHF**: Connected to the backbone via a green line.
- GPS** (Garmin): Connected to the backbone via a green line.
- Easy AIS**: Connected to the backbone via a pink line.
- NMEA #1 0183**: Connected to the backbone via a green line.
- NMEA #3 0183**: Connected to the backbone via a red line.
- RS232 Interface box**: Connected to the backbone via a blue line.
- RN300**: Connected to the backbone via a black line.
- Autopilot**: Connected to the backbone via a blue line.
- Fluxgate Compass**: Connected to the backbone via a black line.
- Rudder Reference Unit**: Connected to the backbone via a black line.
- SailPilot**: Connected to the backbone via a black line.
- Wind Transducer**: Connected to the backbone via a black line.
- Depth Transducer**: Connected to the backbone via a black line.
- Speed Transducer**: Connected to the backbone via a black line.
- Wind display**: Connected to the backbone via a black line.
- Depth Speed display**: Connected to the backbone via a black line.
- Garmin Marine Network**: Connected to the backbone via a red line.

The backbone is labeled **Seataalk** and is represented by a horizontal black line. Dashed red lines with '+' symbols indicate connection points for various components.

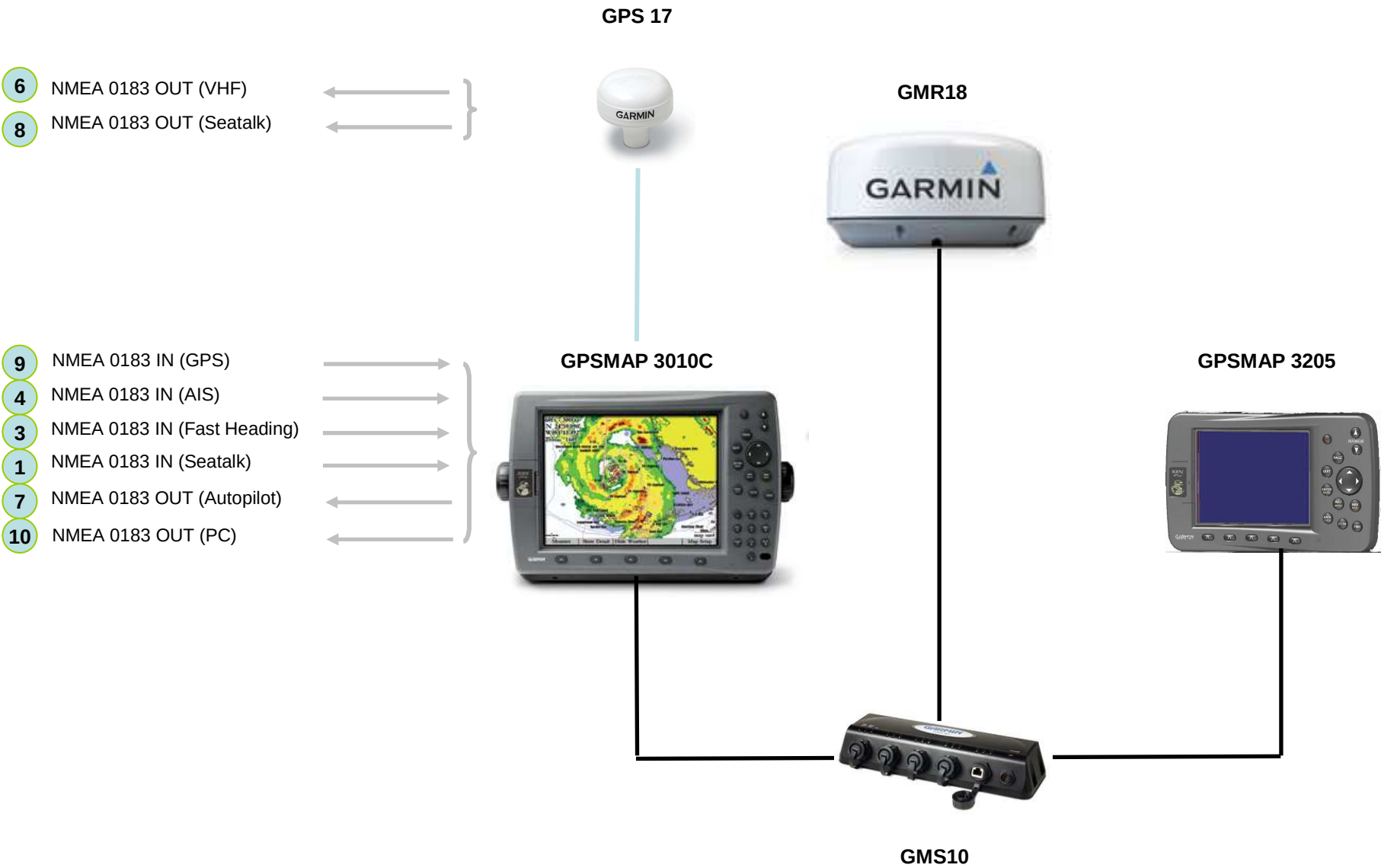
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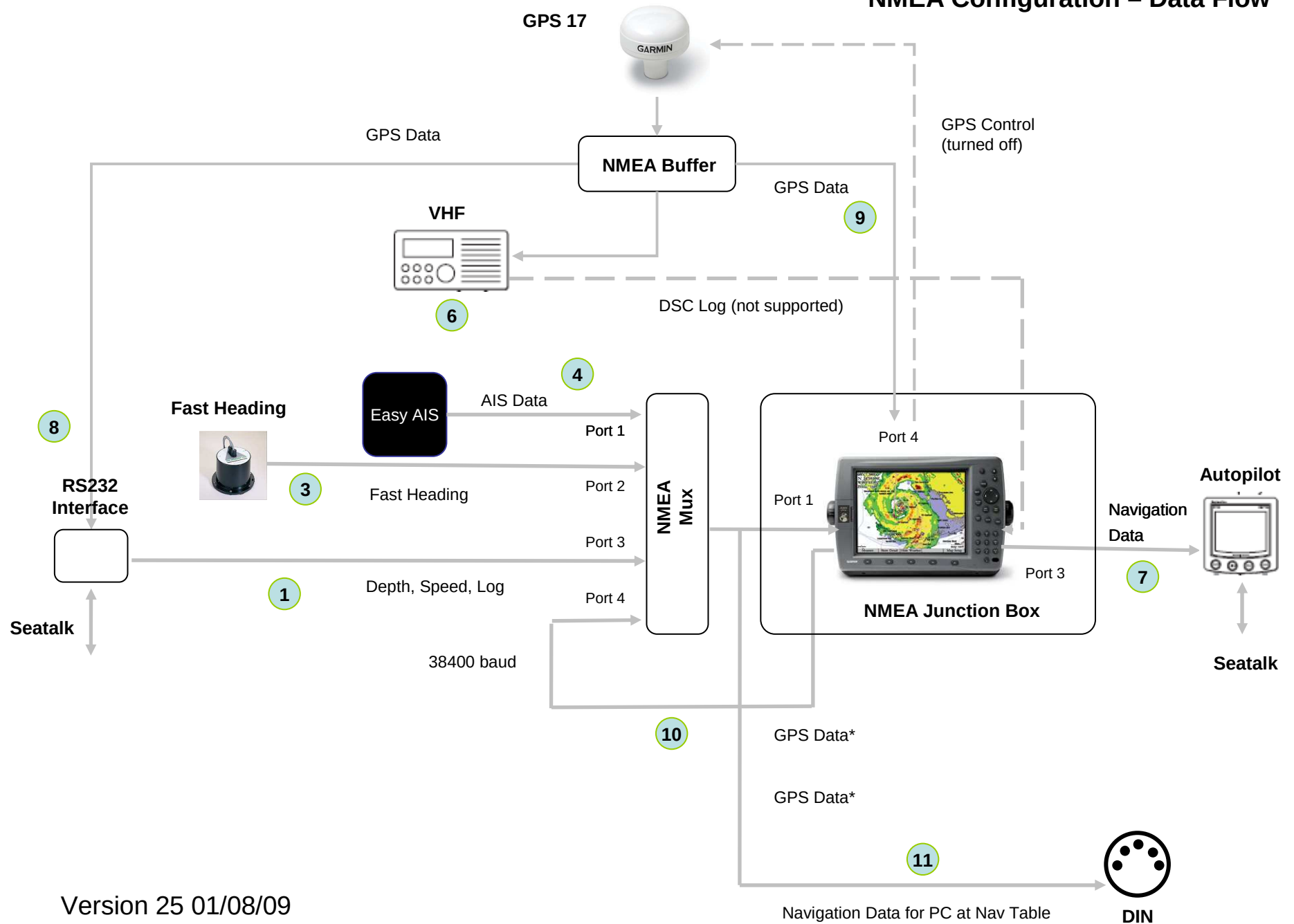
Seataalk Configuration



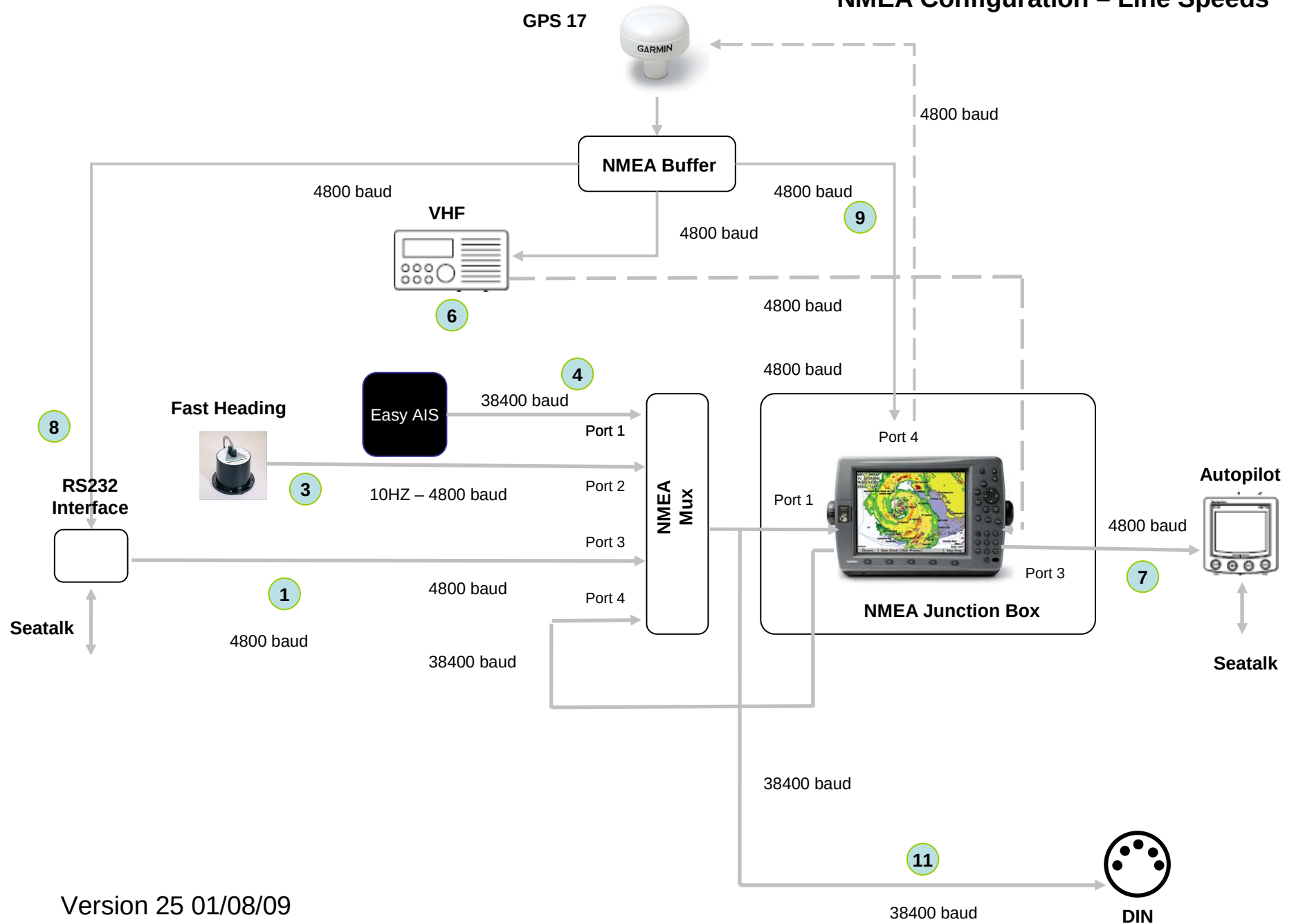
Garmin Marine Network



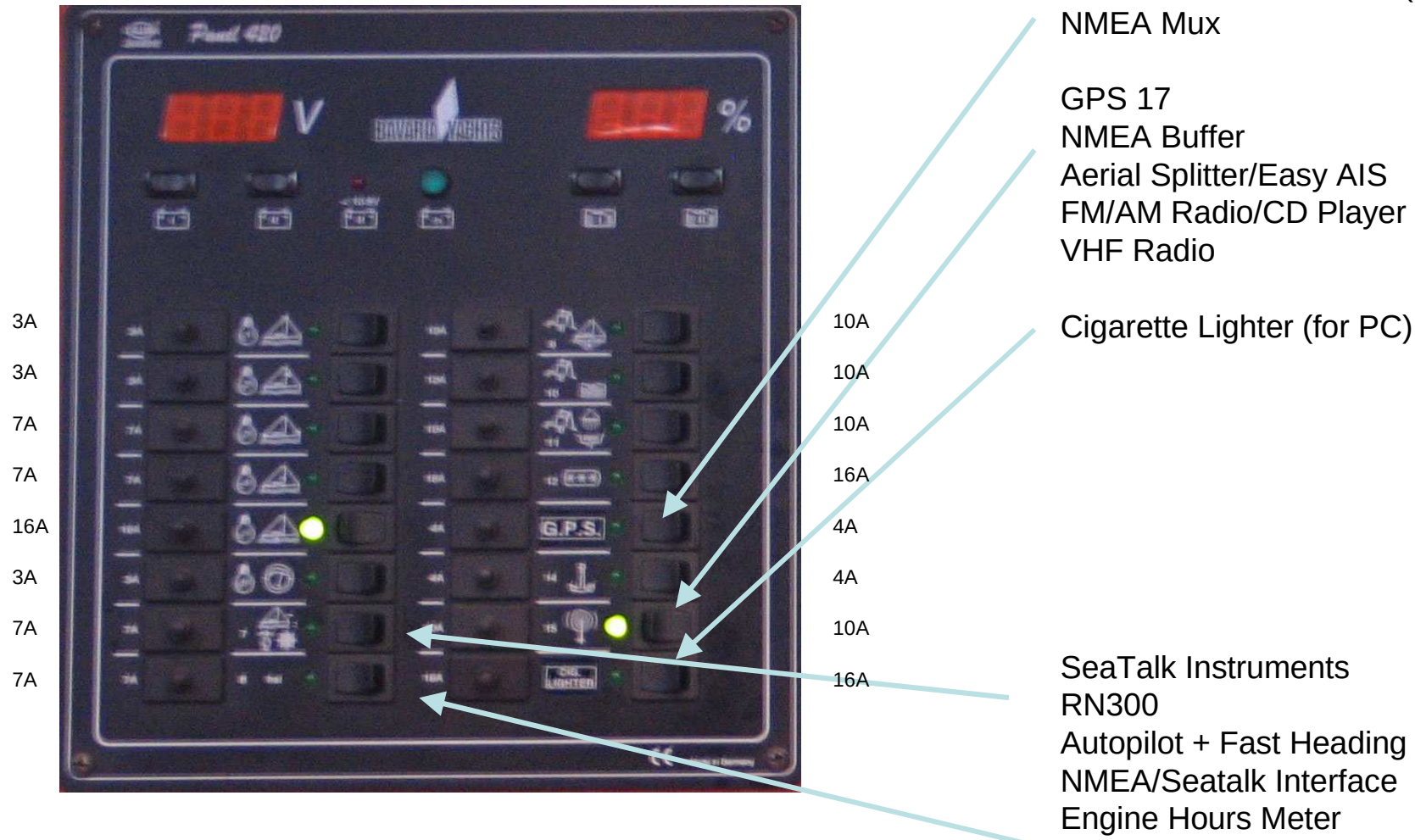
NMEA Configuration – Data Flow



NMEA Configuration – Line Speeds



Power – Breaker Panel



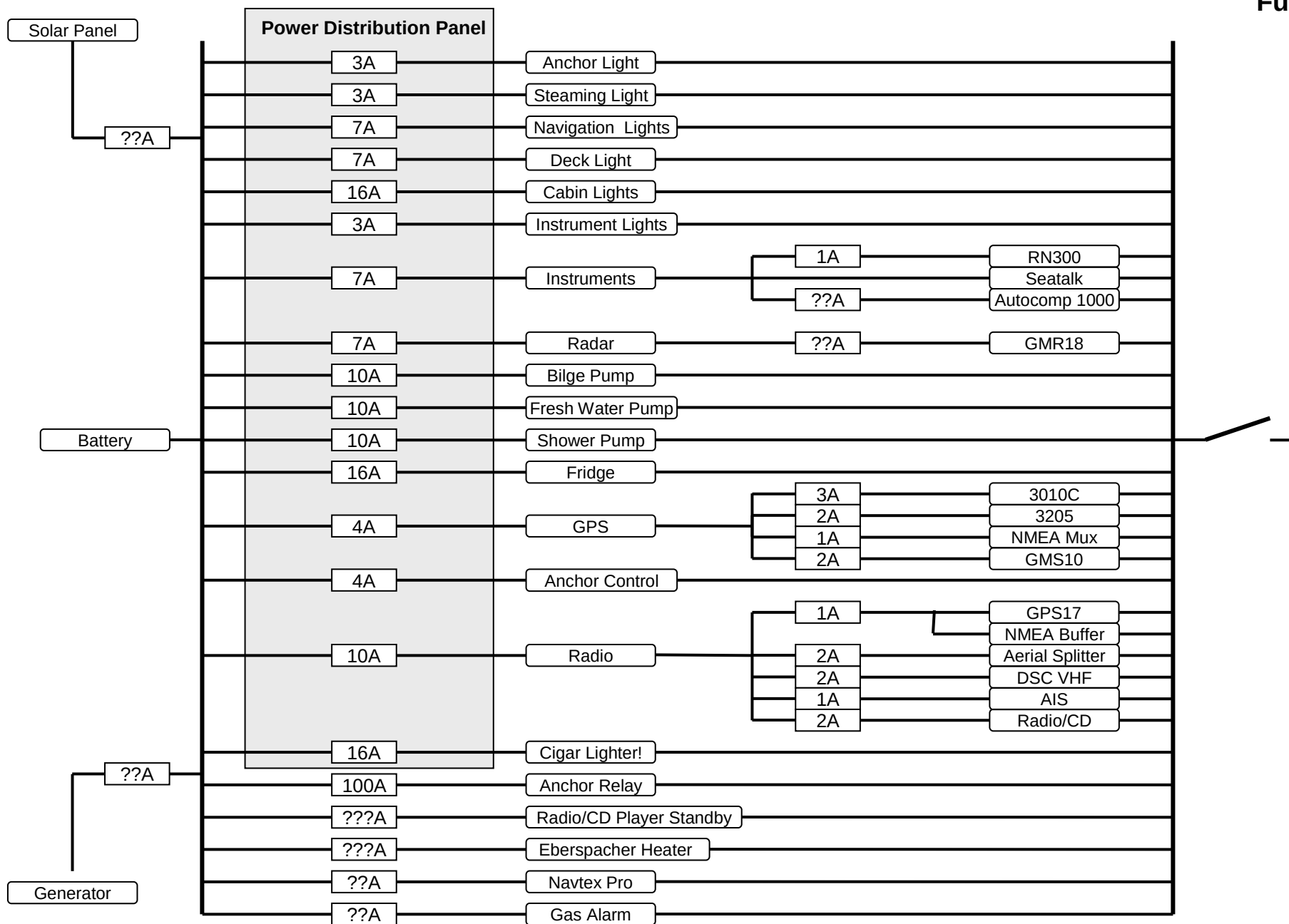
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Power – Breaker Panel



- | | |
|-----|--|
| 10A | <p>The following are powered indirectly to the Breaker Panel:</p> <ul style="list-style-type: none"> • FM/RADIO – Permanent connection • Heating • Anchor Windlass Relay • Navtex • Gas Alarm |
| 10A | |
| 10A | |
| 16A | |
| | |
| 4A | |

Fuses



Version 25 01/08/09

To operate in reduced power mode the following options are available:

- | | |
|---------------|--|
| Mode 1 | "Radio" only – will provide VHF with GPS position for GMDSS positioning |
| Mode 2 | "Instruments" only – will provide basic Raymarine navigation aids only with no GPS position |
| Mode 3 | "Instruments" + "Radio" will provide all the above plus RN300 and Autopilot |
| Mode 4 | "Instruments" + "Radio" + "GPS" will provide all the above plus Garmin chart plotting, Auto pilot and AIS |
| Mode 5 | "Instruments" + "Radio" + "GPS" + "Radar" will provide all the above plus Radar and MARPA |

Under normal conditions the system should be in Mode 4 with Mode 5 selected when Radar is required.

Garmin 3205/3005C Power/Cable Wiring

Power/Data Cable Wiring

The following pages contain several wiring diagrams. The first diagram on the next page is a simple diagram showing the GPSMAP 3005C MFD using the 18-pin Power/Data wiring harness and the GPS 17. If two or more GPSMAP 3005C/3006C/3010C units are installed and networked, only one GPS 17 antenna needs to be installed. Next are wiring diagram examples showing the GPSMAP 3005C using the 18-pin Power/Data wiring harness interfacing with a variety of different equipment. Refer to the wiring diagram that best suits your needs. For third-party devices, be sure to refer to the wiring guidelines included with that equipment. Use 22 AWG (18 AWG for the Red and Black wires), shielded, twisted-pair wiring for extended runs of wire. Solder all connections and seal the connection with heat shrink tubing. If networking two or more MFDs, NMEA devices only need to be attached to one MFD on the network. A pinout of the cable is shown below.

Power/Data Cable Input/Output Ports

The GPSMAP 3005C Power/Data cable has three I/O (Input/Output) ports.

Port 1—communicates with other NMEA-compliant devices, such as VHF radios, NMEA instruments, autopilots, PCs, or Garmin Sounder Modules. You can input one NMEA device to each port, and output in parallel to three NMEA devices per port.

Port 2—is reserved for use with Garmin Sounder Modules or NMEA devices.

Port 3—is reserved for use with the Garmin GPS 17 GPS/WAAS antenna.

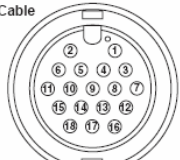
The following formats are supported for connection of external devices: Garmin proprietary Sonar Module and NMEA 0183 version 3.01. The following are the sentences for NMEA 0183, version 3.01 and later output:

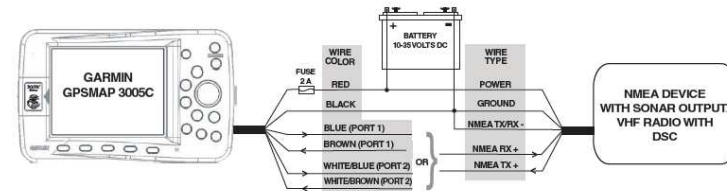
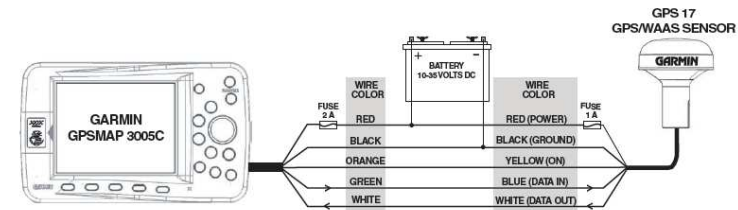
Approved Sentences—GPBWC, GPRMC, GPGGA, GPGSA, GPGSV, GPGLL, GPBOD, GPRMB, GPRTE, GPVTG, GPWPL, and GPXTE.
Garmin Proprietary Sentences—PGRME, PGRMM, and PGRMZ.

The unit also includes NMEA input with support for the WPL sentence, DSC, and sonar NMEA input with support for the DPT, MTW, VHW, HDG, and HDM sentences. The unit interface must be set to NMEA In/NMEA Out.

Documentation concerning NMEA & RTCM formats and sentences are available for purchase from:

National Marine Electronics Association (NMEA)
Seven Riggs Avenue
Severna Park, MD 21146
U.S.A.
www.nmea.org

Power/Data (NMEA) Cable		
		
Cable End View		
PIN #	COLOR	FUNCTION
1	N/C	
2	N/C	
3	N/C	
4	WHITE/BROWN	PORT 2 DATA IN
5	WHITE/BLUE	PORT 2 DATA OUT
6	ORANGE	ACCESSORY ON
7	N/C	
8	N/C	
9	N/C	
10	N/C	
11	YELLOW	ALARM LOW
12	N/C	
13	WHITE	PORT 3 DATA IN
14	GREEN	PORT 3 DATA OUT
15	RED	DC POWER INPUT
16	BROWN	PORT 1 DATA IN
17	BLUE	PORT 1 DATA OUT
18	BLACK	GROUND (POWER/DATA)



Garmin 3010C Power/Cable Wiring

Power/Data Cable Wiring

The following pages contain several wiring diagrams. The first diagram on the next page is a simple diagram showing the GPSMAP 3000 series chartplotter using the 18-pin Power/data cable and the GPS 17x. If two or more GPSMAP 3000, 4000, or 5000 series chartplotters are installed and networked, only one GPS 17x antenna needs to be installed. Next are wiring diagram examples showing the GPSMAP 3000 using the 18-pin Power/Data wiring harness interfacing with a variety of different equipment. Refer to the wiring diagram that best suits your needs. For third-party devices, refer to the wiring guidelines included with that equipment. Use 22 AWG (18 AWG for the Red and Black wires), shielded, twisted-pair wiring for extended runs of wire. Solder all connections and seal the connection with heat shrink tubing. **If networking two or more chartplotters, the GPS 17x and NMEA input devices should only be attached to one chartplotter on the network.** A pinout of the cable is shown below.

Power/Data Cable Input/Output Ports

The GPSMAP 3000 series Power/data cable has four I/O (Input/Output) ports.

Ports 1 and 2—communicate with other NMEA-compliant devices, such as VHF radios, NMEA instruments, autopilots, or PCs (Port 1 only). You can input **one** NMEA device to each port, and output in parallel to **three** NMEA devices per port.

Port 3—is reserved for use with Garmin sounder modules.

Port 4—is reserved for use with the Garmin GPS 17x GPS antenna.

The following formats are supported for connection of external devices: Garmin proprietary sonar module and NMEA 0183 version 3.01. The following are the sentences for NMEA 0183, version 3.01 and later output:

Approved sentences—GPBWC, GPRMC, GPGGA, GPGSA, GPGSV, GPGLL, GPBOD, GPRMB, GPRTE, GPVTG, GPWPL, and GPXTE

Garmin proprietary sentences—PGRME, PGRMM, PGRMZ, and PSLIB

The unit also includes NMEA input with support for the WPL sentence, DSC, and sonar NMEA input with support for the DPT (Depth) or DBT, MTW (Water Temp), and VHW (Water, Speed, and Heading) sentences. The unit interface must be set to NMEA In/NMEA Out.

Documentation concerning NMEA and RTCM formats and sentences are available for purchase from:

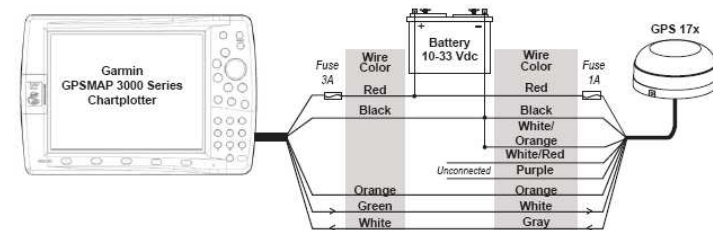
National Marine Electronics Association (NMEA)
Seven Riggs Avenue
Severna Park, MD 21146
U.S.A.
www.nmea.org

Function	Color	Pin #
DC power input	Red	15
Ground (Power/data)	Black	18
Port 1: Data in (Rx)	Brown	16
Port 1: Data out (Tx)	Blue	17
Port 2: Data in (Rx)	Violet	9
Port 2: Data out (Tx)	Gray	10
Port 3: Data in (Rx)	White/Brown	4
Port 3: Data out (Tx)	White/Blue	5
Accessory on signal	Orange	6
Port 4: Data in (GPS 17x)	White	13
Port 4: Data out (GPS 17x)	Green	14
Alarm low signal	Yellow	11
No function	No color	1,2,3,7,8,12

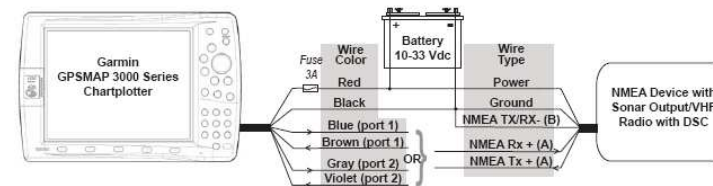


Cable End View

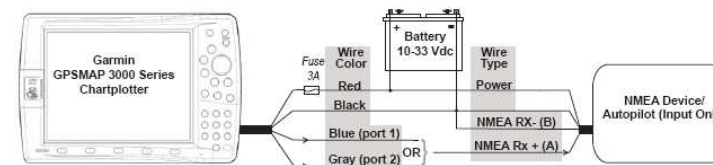
Power/Data(NMEA) Cable



GPSMAP 3000 Series Chartplotter Wired to a GPS 17x

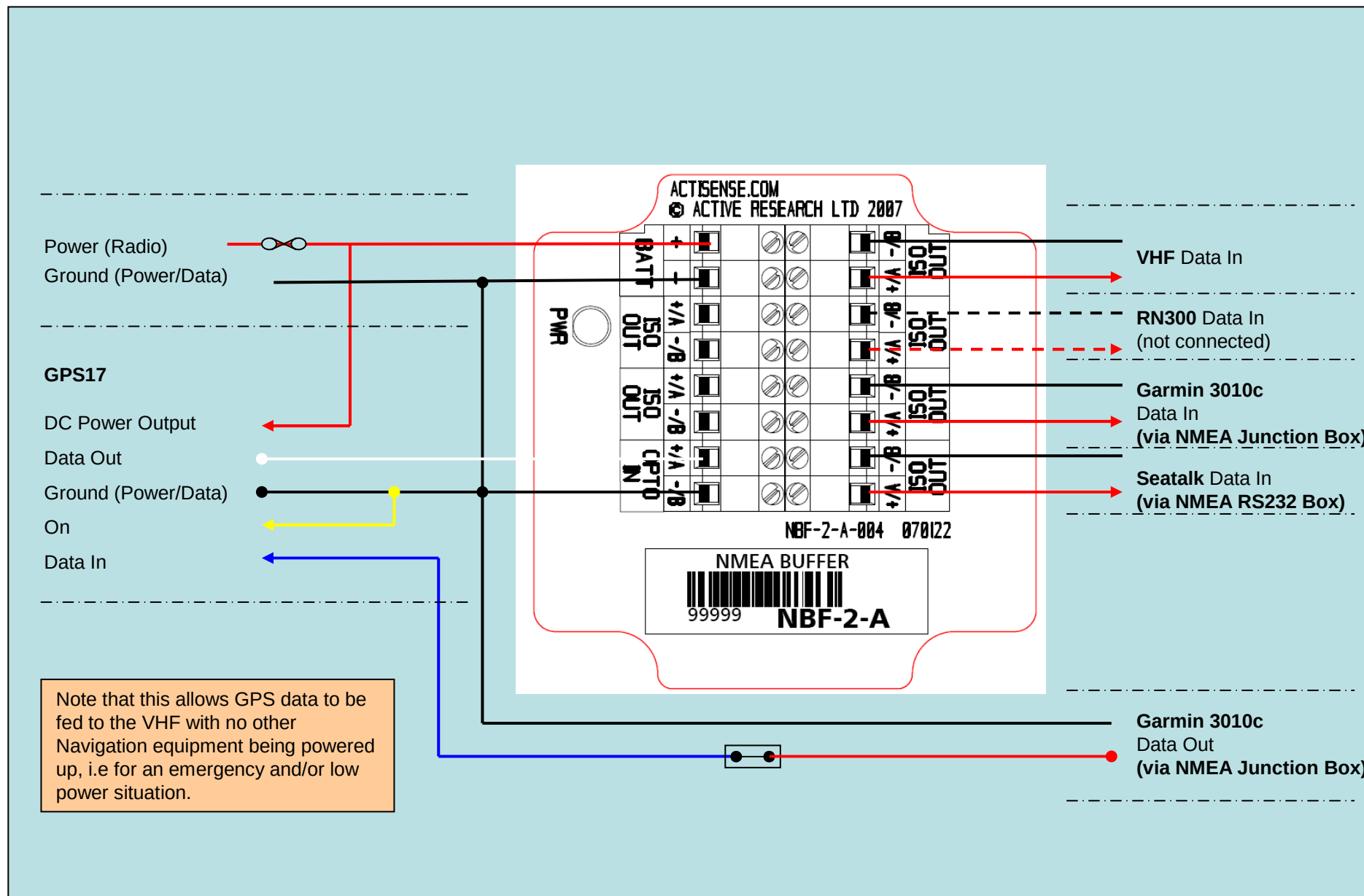


GPSMAP 3000 Series Chartplotter Wired to an NMEA Device With Two-way Communication

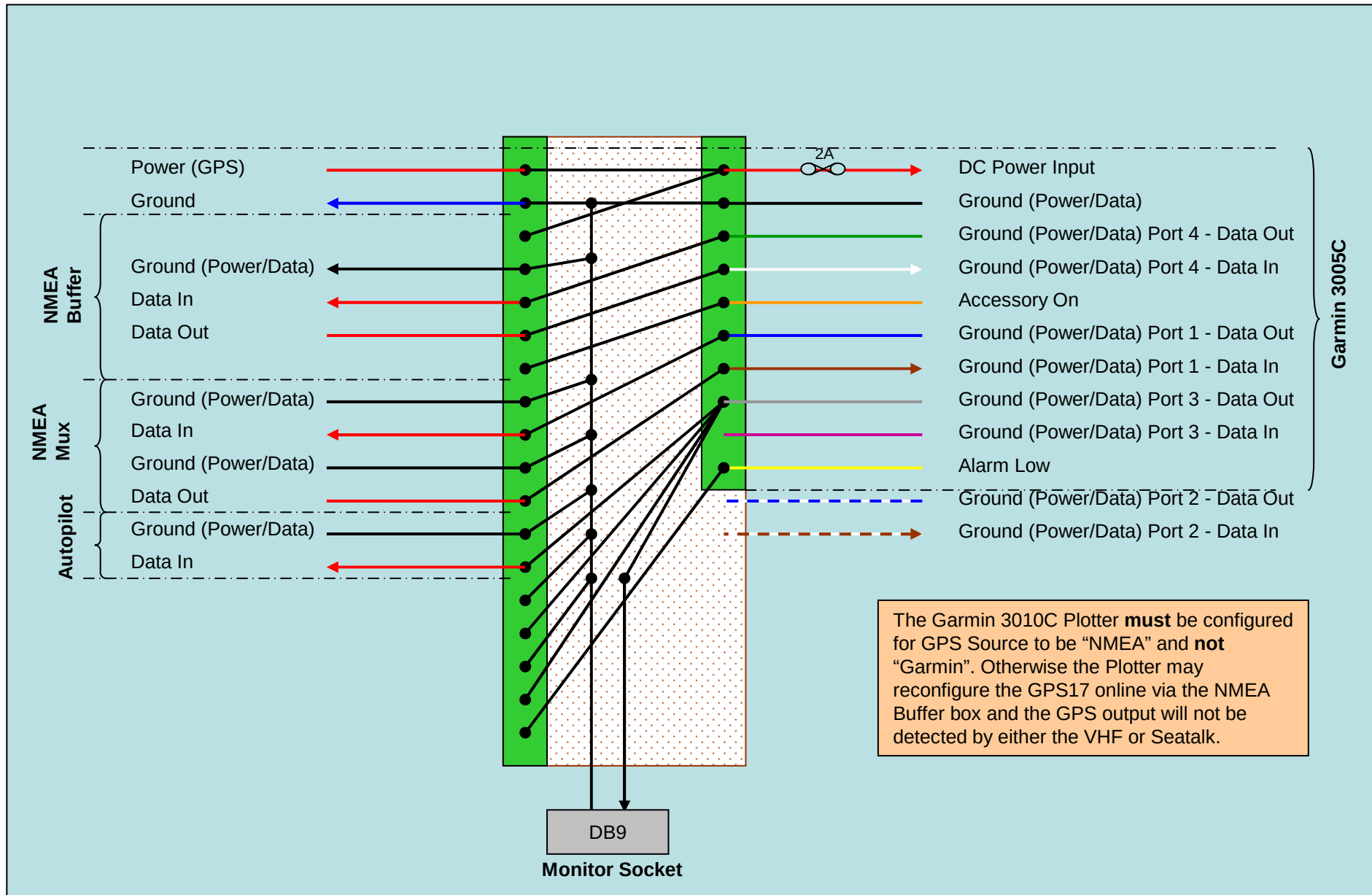


GPSMAP 3000 Series Chartplotter Wired to an NMEA Device With One-way Communication

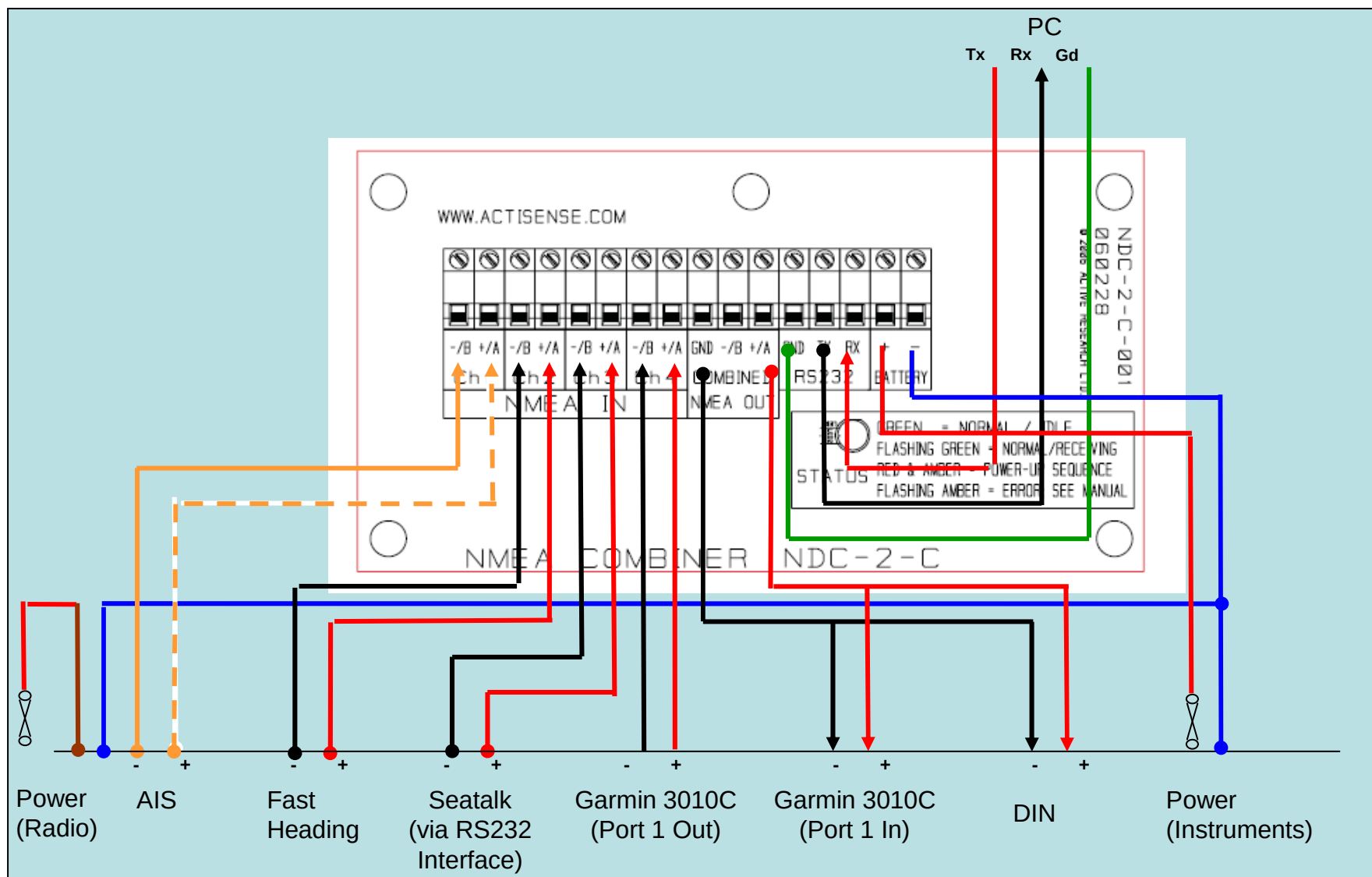
NMEA Buffer Box



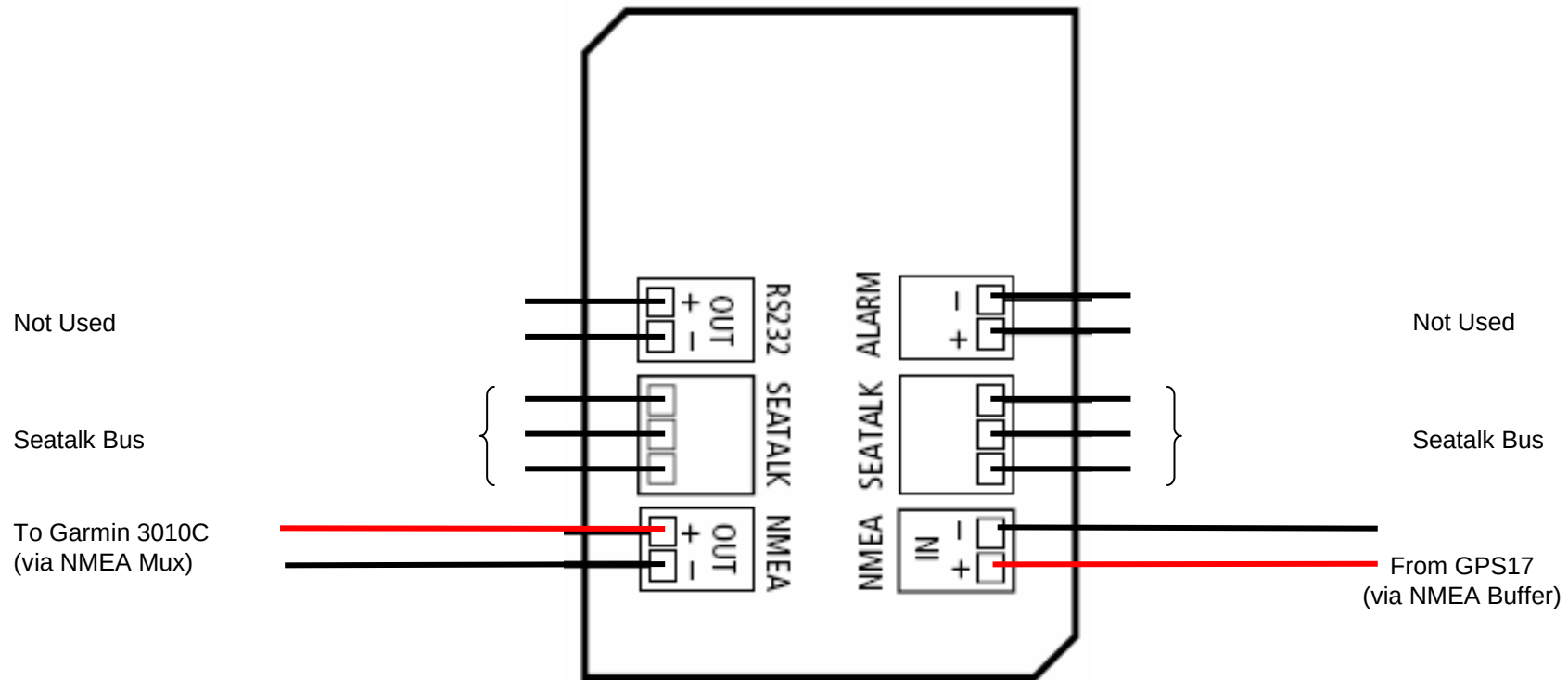
NMEA Junction Box



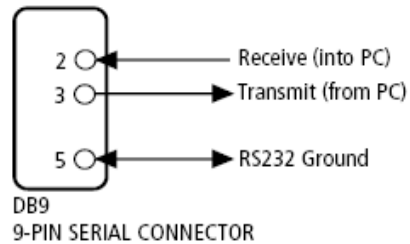
NMEA Mux



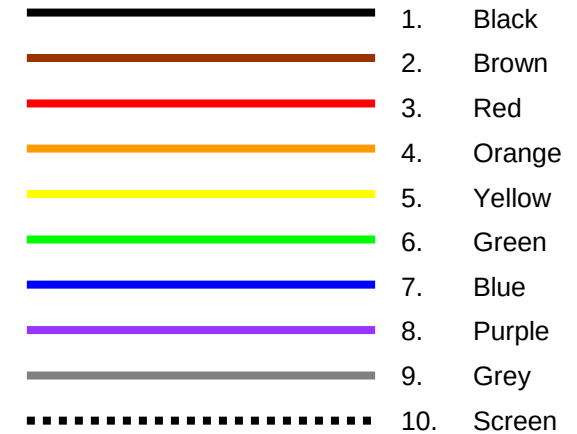
RS232 Interface Box - Wiring



RS232 DB9 Pin Wiring



Common colour
coding for DB9
Data Cable

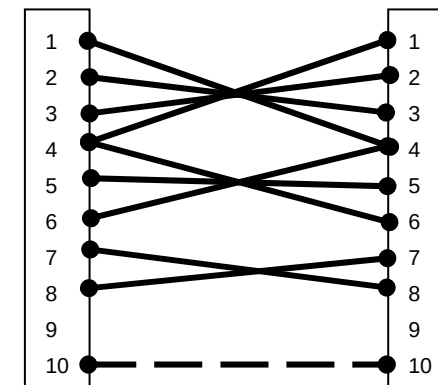


DIN Socket:

NMEA data input (+ve) Yellow
NMEA data input (-ve) common Green
NMEA data output (+ve) Red
NMEA data output (-ve) common Blue

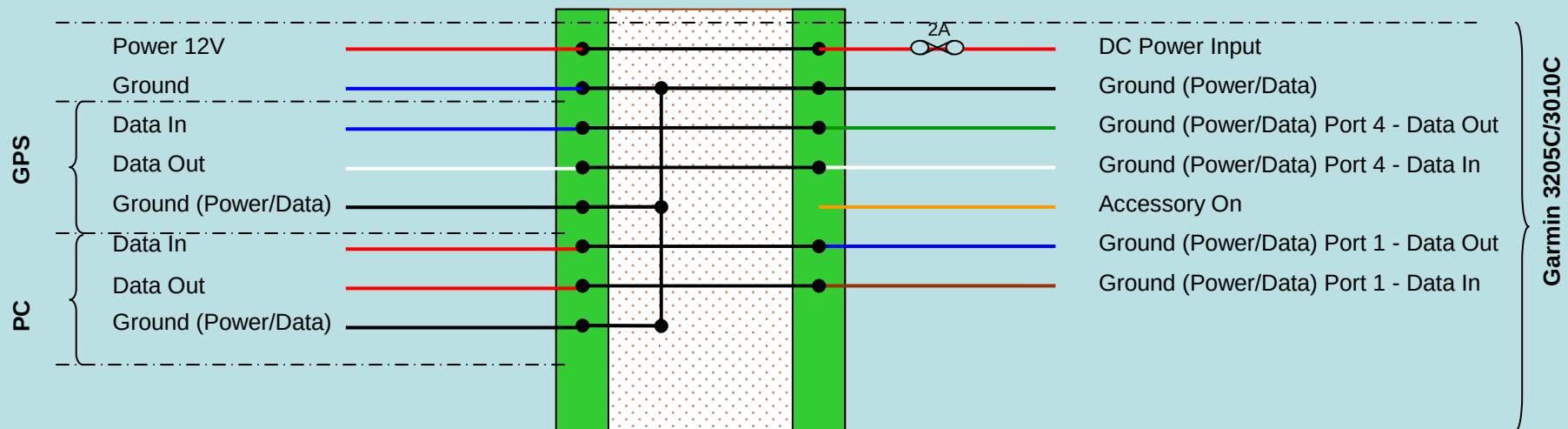
RN300 Cable:

1. Battery negative Black
2. Battery positive Red
3. NMEA data input (+ve) White
4. NMEA data input (-ve) common Green
5. Not connected Gray
6. NMEA data output (+ve) Yellow
7. NMEA data output (-ve) common Brown
8. Not connected Screen



Null Modem

Garmin Standalone Break-out Box



1. To connect GPS17. Set Garmin 3010C GPS Set-up to Source="Garmin" WAAS="ON"
2. To connect GPS III Plus. Set Garmin 3010C GPS Set-up to Source="NMEA"
3. To Monitor Garmin 3010C on PC. Set 3010C Port 1 to "NMEA High Speed". Configure PC to relevant COM port and Port to "NMEA" Speed "38400"
4. To upload/download Waypoints and Routes Set Garmin 3010C Port 1 to "Garmin Data Transfer". Set PC to "Serial USB/Serial" Speed "38400"

Source	NMEA IN		P o r t	Speed	Destination
AIS	AIVDM	AIS Data	1	38400	3005C/3205
Fast Header	HCHDM	Heading Magnetic	1	4800	3005C/3205
Seatalk	IIMTW	Mean Temp. Water	1	4800	3005C/3205
	IIVHW	Water Speed & Heading	1	4800	3005C/3205
	IIDPT	Depth		4800	3005C/3205
GPS	GPGBA	Fix Data		4800	3005C/3205/ DSC/RN300
	GPGLL	Lat. & Long.		4800	3005C/3205/ DSC/RN300
	GPGSV	Satellites In View		4800	3005C/3205/ DSC/RN300
	GPBOD				
	GPAPB	Autopilot		38400	RN300/ST5000
	GPBWC	Bearing & Dist. To Waypoint		38400	RN300/ST5000
	GPRMB	Recommended Min. Navigation Info.		38400	RN300/ST5000
	GPRMC	Recommended Min. Navigation Info.		38400	RN300/ST5000
	GPVTG				RN300/ST5000
	GPXTE				RN300/ST5000



Power – Specification

GPSMAP 3205	12W max
GPSMAP 3010	25W max
GMS 10	2.75W max
Radar – GMR18	33.5W max
SeaTalk Instruments (Windx2/Depth/Speed) RN300 Autopilot ST5000plus KVH Autocomp	40W max (<13 instruments) 3W to 6W with full backlighting 0.7 – 2.4W (Standby) 6 -18W (Auto) The power to the SeaTalk Bus must be provided by the Autopilot Head which has its own power socket – 12 A fuse recommended) 1.56W ??? max (powered from the SeaTalk Bus)
NMEA/Seataalk Interface (???)	Low
Aerial Splitter – EasySplit	Low
RD68 Fixed DSC VHF Radio FM/AM Radio/CD Player	5.5 Amps Low (on standby) 120W (full volume)
Navtex	Low
Cigarette Lighter (for PC)	???
EasyAis	Low
NMEA Mux	26-30mA
Engine Hours Meter	Low
Dual watch Gas Alarm	???