INSTRUMENTS

ATP Processor

Operation User Guide V2.1.2

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CE

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Introduction

About this Manual

This user guide assumes familiarity with the marine navigation systems and basic PC software tools.

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This guide covers the ATP1 Instrument processor and aspects of the webserver interface which is needed to set up the processor, calibrate it and carry out diagnostics.

Throughout the generalisation GNSS (Global Navigation Satellite System) is used to refer to GPS, Galileo, GLONASS and the other such positioning systems.

ATP1 Processor

The ATP processor covered in this manual is the core product from A+T and is aimed at racing boats, superyachts and large cruising and classic yachts.

Multi-Fuel connectivity

As many initial users of the ATP are yachts which have an installed base of B&G Fastnet displays, sensors and wiring, the ATP supports these with no change. The ATP therefore has four core databus connections: -

- Ethernet network carrying the ATP databus protocol (ATPDB)

This a standalone network which uses its own IP addressing and protocols. It can also carry power to peripheral devices (but it is not industry standard POE). It links A+T sensors and displays.

- A second general purpose Ethernet network connection.

This is a standard network connection intended to sit on the yacht's main network and used to access the ATP web server. If then connected to a wireless network, then any connected computer or tablet can access the ATP web server.

- Fastnet

This supports existing B&G displays, sensors and wiring including A+T displays connected to Fastnet.

- CANbus

An N2K compatible CANbus connector allows N”K and compatible sensors to provide data to the ATP and allows data from the ATP to drive displays, chart plotters and other N2K or compatible units..

Typical System

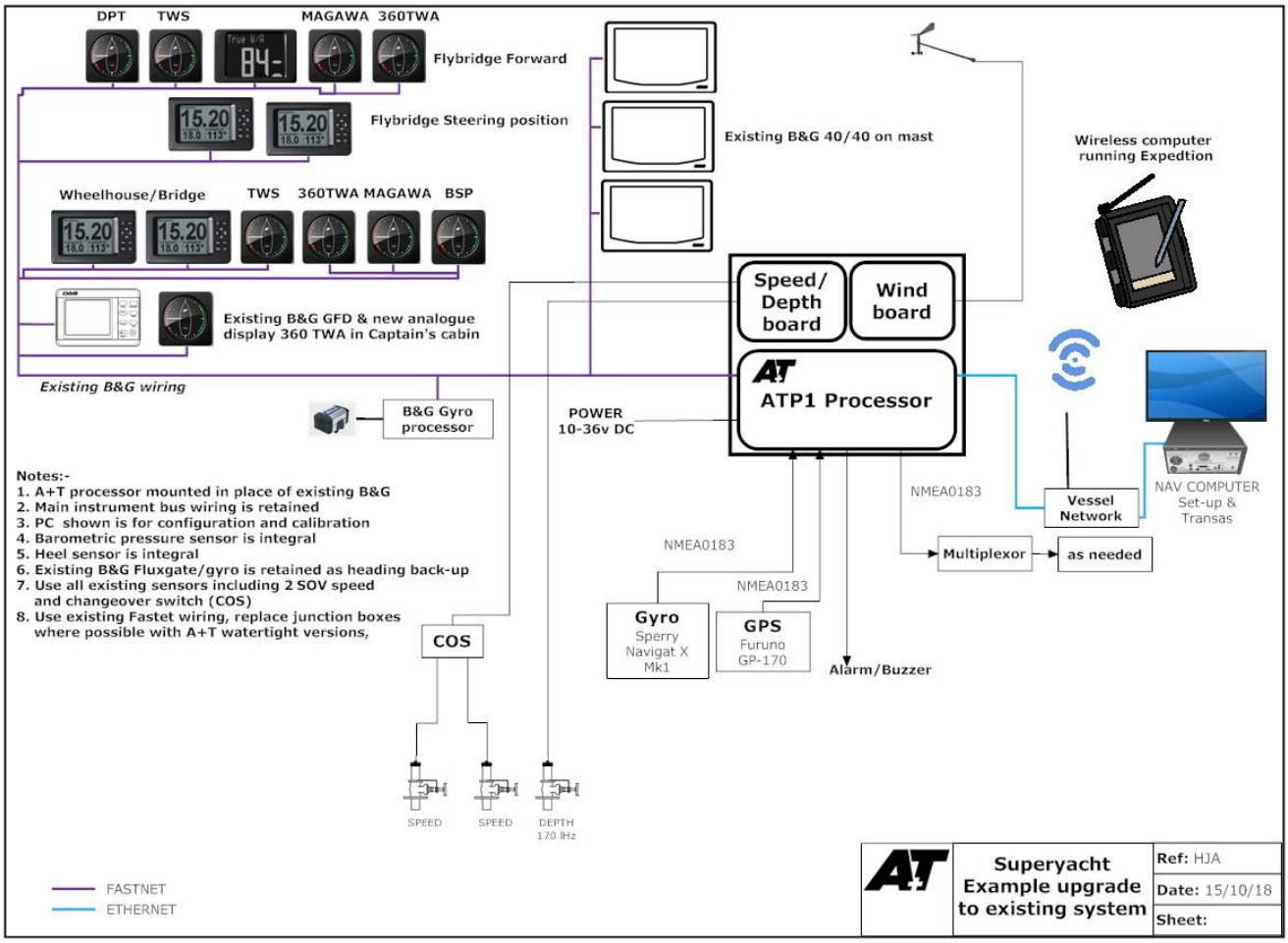


Figure 1- Example Superyacht System

Webserver

Central to the setting up, calibrations and diagnostics of the ATP is the built-in webserver. It can be accessed from a suitably connected PC, MAC or tablet. All likely installations of the ATP will have a dedicated computer, and this is the prime tool for setting up and calibrating the system.

Calibration and other system controls from displays are restricted to a few key functions.

As well as the ease of use, room for explanation and 'tool tips', the other advantage of the webserver is that the user can see much of the calculation going on in the ATP processor and is provided with considerable diagnostic information.

Expedition performance and navigation software

Once configured from the webserver, the ATP is intended to work as a stand-alone system with no connection to either a computer or internet. Attention has been given to producing fast, reliable calculation and output of high quality core data required to sail the yacht.

Higher level functions such as start-line, laylines, optimal routing, sail selection and the weather are not included and are left to be provided by dedicated software solutions such as Expedition and displayed using external channels with no practical limit. The ATP has been developed for use specifically with Expedition both to provide these functions and to provide for editing and uploading of performance information. Other software packages may be interfaced over time.

The ATP does provide target performance information, even when not connected to a computer, but does not provide for its editing or updating which is done in Expedition.

The ATP does not provide data logging. This is left again to Expedition or a connected computer application. A higher specification processor due for launch in 2019 will include very extensive and high data-rate logging capability.

Overview of this user guide

This user guide mainly provides the background and explanation of how the ATP works. Detailed 'how to' is not provided as this is generally intuitive from the webserver. Updates are continually produced reflecting feedback and system development.

Please visit: - www.AandTinstruments.com/downloads for the latest version of the manual and the ATP software.

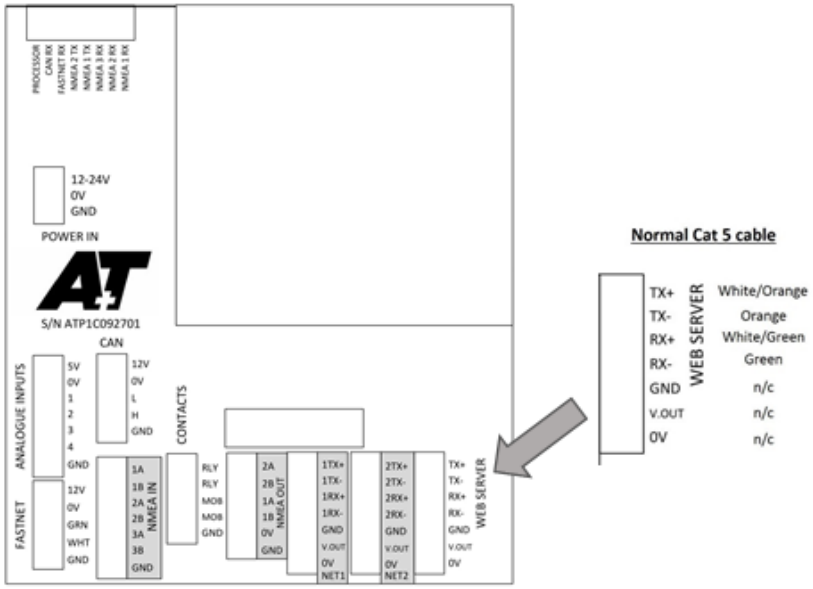
Webserver & Network Connection

Getting Started

- First step is to provide power to the unit. Connect a power source between the range; 10 – 36 V dc.
- Next gain access to the webserver via the ATP Ethernet port. This can be direct (on older computers or if difficulty then a cross-over cable or switch should be used) or by connecting the ATP to an existing network with a DHCP server. If this is required, then ensure the ethernet is connected both to the ATP and to the DHCP server before powering up the unit.

IP Addressing

- When shipped the ATP has fixed IP address 192.168.1.219
- On power up, the ATP waits for 5 seconds to see if a DHCP server is providing an IP address on the connected network (if there is one). If no DHCP address is received, then the IP address reverts to its fixed IP address. This may be changed once initial access to the webserver is achieved.
- To determine the IP address that the ATP has adopted check the small LCD display in top left corner of ATP cabinet. It can also be shown on any connected display on the Fastnet bus under MENU/ATP1/IP ADDR or Channel 254.



Ethernet port wiring

Linking to the webserver

- Enter IP Address as above into any browser on PC, Mac or Tablet and the page as shown below should appear.

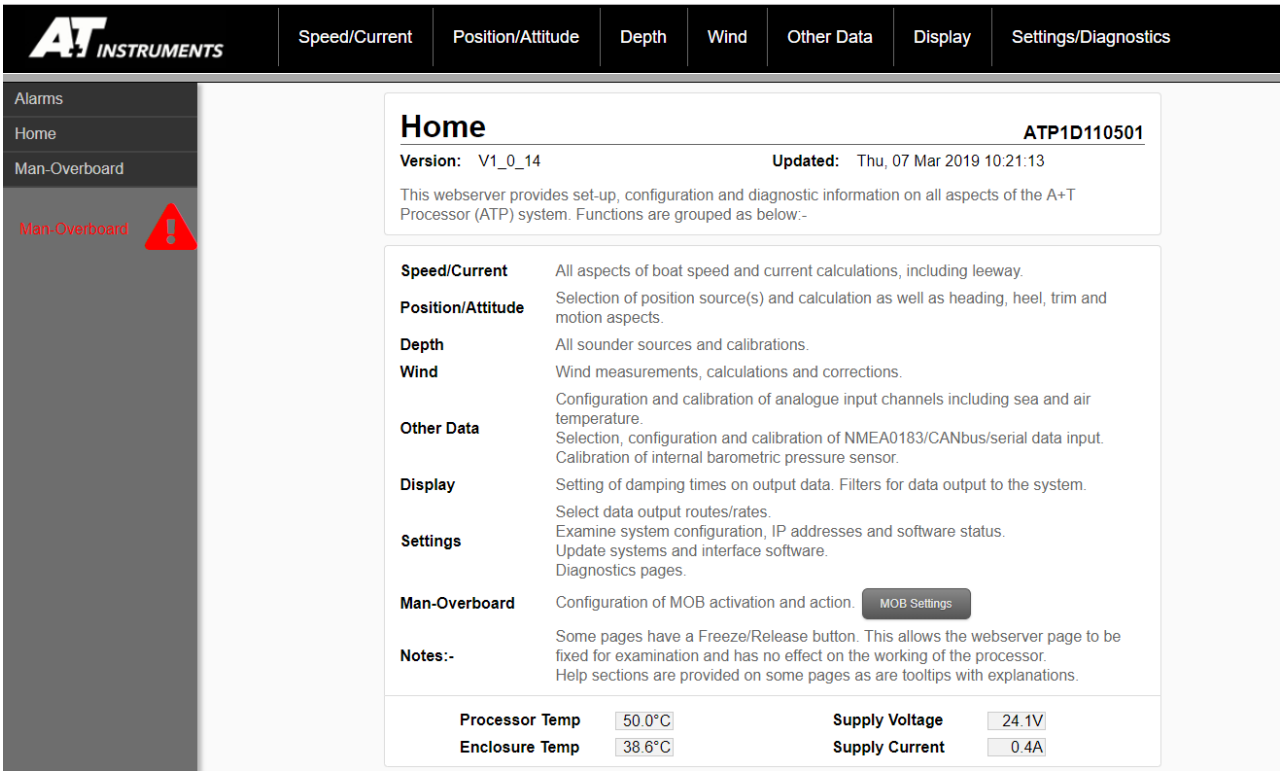


Figure 2-Webserver Homepage

Note that if a computer is connected directly via an Ethernet cable to the ATP then the LAN address of the computer will have to be manually set to 192.268.1.xxx in order for it to communicate.

General Principles

- Note that changes entered on any page are not implemented until either OK or APPLY is clicked

- On all pages with real-time updating fields there is a HOLD button in the top right corner which holds a synchronised snapshot of any dynamic data. It can be released by clicking the button again or by changing the page displayed. Holding the Web server pages in this way has no effect on calculations or displays on the system.

Speed Sensor

The ATP speed input is primarily oriented around taking the raw pulse input from a pulse type paddle-wheel log. These are still the most reliable all-round speed sensors, despite the drawbacks of fouling, boundary layer effects and aeration. They also have the advantage of directly reading water run distance which is the best input for current calculation.

Two such logs (port and starboard) are generally catered for with a changeover switch (COS) so the processor only sees a single pulse train which is switched from side to side. Alternatively two input boards can be used within the processor to achieve the same. This method also allows for a degree of security should one board fail.

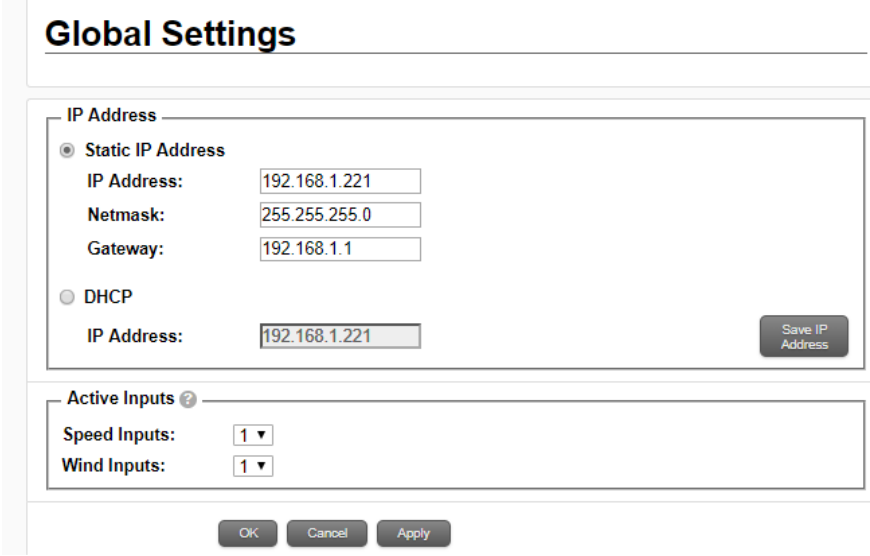
Calibration is via a single Hz value, typically in the range, 1-6 representing the pulse rate produced from 1 knot of boat speed,.

For many users a single calibration value, usually established by motoring over several runs calibrated against GNSS will suffice. The webserver provides a tool for doing this.

For more sophisticated applications, the calibration factor may be varied for different speeds and for different heel angles and tacks. This is set up in the webserver under ADVANCED in the speed/log section.

Provision for taking speed information from either a doppler log or EM log. These can be interfaced using either NMEA0183 or N2K.

One or two ‘smart’ paddle wheel logs may also be used. If there are two then selection criteria of which to use can be chosen as based either on heel or apparent wind angle (AWA). Additional speed and wind inputs can be added in Global Settings.



In all cases of non-direct paddle wheel above then calibration factors are provided based on 1.0 being the use of the raw value in knots and the correction table being variation from this.

Pulse Log Input

- Each received pulse is time-tagged and logged (typically representing 0.1m of water passing).
- The rolling calibrated water run log is preserved for current calculation (see Current Calculation Section).
- For speed calculation, a time is entered, and speed is calculated using the actual time stamps for the pulses received in that time window. This give an unbiased and most responsive estimator for both low and high speeds.
- Separate time windows are used for the estimation of speed for the internal calculations and for the displayed speed. These can both be set by the user in the webserver.

Use of GNSS SOG for Speed

To access: Speed/Current-Speed- Use GNSS as speed input

While not ideal there are a number of occasions when this is pragmatic: -

- When a traditional speed sensor is missing or not working.
  A 'get out of jail' solution which still gives a wind solution until the sensor is fixed. Especial care should be taken with lay-lines, wind direction, wind calibration and many other functions when this is selected. The wind solution is neither water wind nor ground wind and odd results are likely in many areas.
- For high-speed sailing where the paddle wheel spends significant time out of the water.
  This is a good solution as current is less relevant. .
- In areas of little or no current.
  Again, using SOG in many cases will be better than a poorly calibrated speed sensor. .

In all these cases then no current can be estimated and the ATP will force current calculation display and output to zero.

The **DANGER** of setting this is doing so for good reasons as above and then forgetting it is set and crew, location or navigator changing and not realising.

Log Calibration

Very rough calibration can be undertaken by comparing the measured boat speed with SoG. If this is done then it should be done in two directions to mitigate the effect of current and a graphing program such as Expedition should be used to compare the two sources of data over a significant period (1-5 minutes) to reduce the effects of noise and time lag in SoG measurement and display.

Note that to make the log read faster then the Hz value must be reduced and vice-versa.

To do a proper log calibration then the MOB function in the ATP can be utilized to display ground distance (GMDSS) against log distance (DR) and this data should be recorded for a number of runs up-current and down current and entered into the A+T log calibration Excel calculation sheet available on the A+T website; see example and notes below:-

			MEASUREMENTS					**COMPUTED**						
Run		**GNSS dist**	**Water run**	**Run time**			**Run Time**	**Current**		**Water Speed**		**Water run**	**ALPHA**	
		m	**m**	**Minutes**	**Seconds**		**Sec**	**m/s**	**Kt**	**m/s**	**Kt**	**m**		
1	»	1150	1252	2	44		164							CLEAR
2	«	980	830	1	48		108	-1.03	-1.99	8.04	15.55	869	4.7%	
3	»	1020	1110	2	25		145	1.02	1.97	8.05	15.57	1168	5.2%	
4	«	1220	1033	2	16		136	-0.97	-1.87	8.00	15.47	1088	5.4%	Example Data
5	»						0							
6	«						0							

Notes/Instructions

1	Calibrations shoul be done with and against any apparent current - not across it
2	Runs should be made in alternating directions and entered into the table above
3	Enter; GNSS distance, DR distance and the time in min & sec of the run. The total seconds is then calculated
4	At leasst two runs are required to resolve the calibration and current
5	Further runs give additional computation based on the current run and thre one immediately above
6	Furtehr runs also allow for current and calibration confidence to be obtained
7	Once sufficient runs made, exclude any with 'outlier' values and then take average of the remaining ALPHA values
8	Positive ALPHA measn the log is underreading by this percentage and so the log needs to be speeded up by this amount
9	Negative ALPHA means the log is overreading by this percentage and so the log needs to be slowed down by this amount
10	For a pulse log, therefore Hz_value_new= (1-APLHA/100)* HZ_value_old; so to speed up log then reduce the Hz vaue and vice-vera
11	For a direct reading log then just change the calibration by ALPHA, so Calib_new=Calib_old*(1+ALPHA/100)
12	To CLEAR data use the CLEAR button (it may be necessary to enable macros to use thiss feature)
13	To see example data use the Example Data botton

Advanced Calibration

To access: Speed/Current-Speed- Advanced Corr.-Advanced

In the instance of:

a) An offset speed sensor; resulting in speed varying from tack to tack
b) Non-linearity and variation in calibration due to heel

A calibration table as shown below can be set up:-

Advanced Calibration

Boat Speed	≤5kt	10kt	15kt	20kt	≥25kt
Heel Angle					
≤-20° P	0%	0%	1.8%	0%	0%
-15° P	0%	0%	1.5%	0%	0%
-10° P	0%	0%	1.0%	0%	0%
-5° P	0.0%	0%	1.0%	0%	0%
0°	-1.0%	BASE%	1.0%	2.5%	3.0%
5° S	0.0%	0%	1.0%	0.0%	0.0%
10° S	0%	0%	1.0%	0.0%	0.0%
15° S	0%	0%	1.5%	0%	0%
≥20° S	0%	0%	1.8%	0%	0%

Figure 3-Example Speed Heel Correction Table

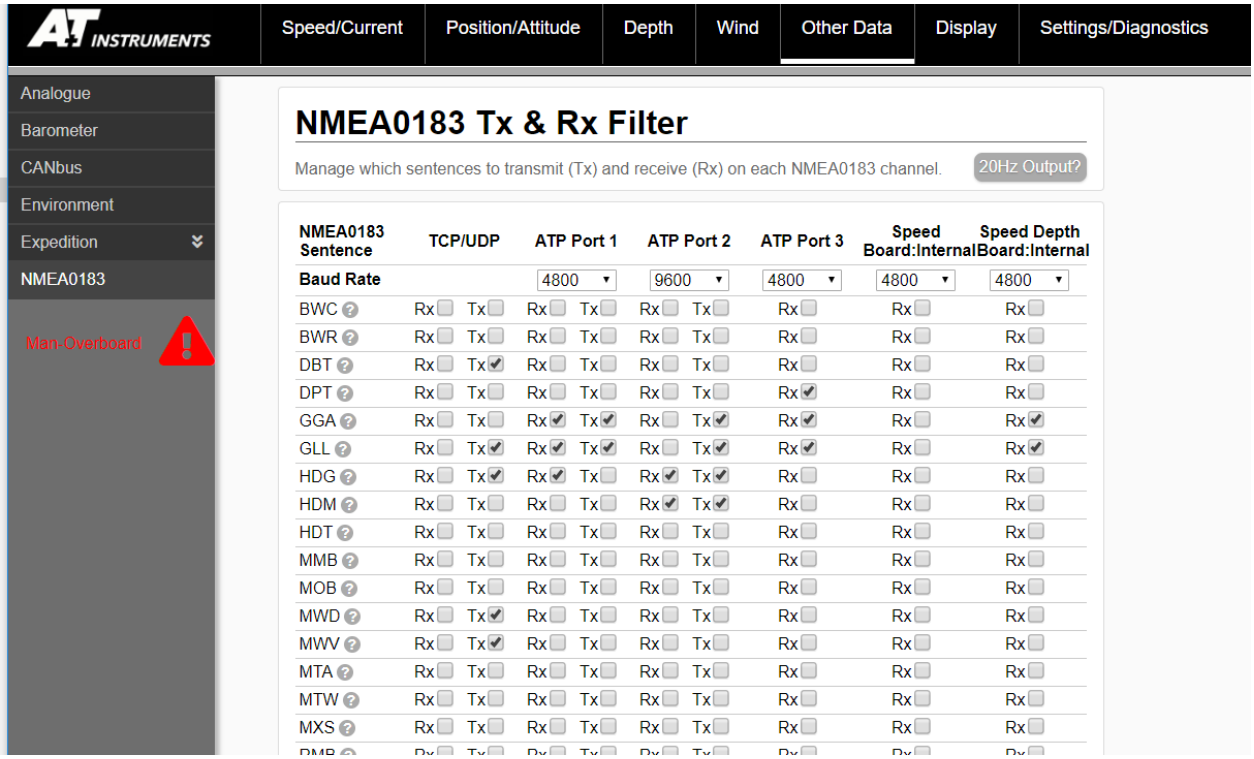
Note that the percentage here makes the boat speed calculate faster than the base calibration. So, in the above table the speed will register 1.8% faster at 15kts at 20 degrees of heel on either tack than its base setting.

Note that linear interpolation is used between the entered values for heel and speed with constant out of range.

Depth

Depth input(s) may come from a variety of sources: -

- Internal depth board on the ATP processor
- External depth board connected on the A+T ethernet databus. In both of these cases, Signal, noise and reliability of reading is available.
- One or more NMEA 0183 sensors
    - The procedure as with much NMEA 0183 interfacing is: -
    - Check that depth input can be seen by looking at the Diagnostics/NMEA0183 page
    - Select the appropriate input filter in the Other Data.NMEA01`83/Filter page



    - Select the chosen input NMEA0183 input channel on the Depth page
- N2K or compatible CANbus depth sensor.

Heading

To access: Position/Attitude-Heading

The ATP Processor is set up to manage input of heading in True or Magnetic and to calculate and display derived variables, such as True Wind Direction in either. An internal model is maintained to compute variation based on the position and date (NOAA WMM2015 magnetic variation model)

Heading data sources include: -

- NMEA0183. This is typically from Gyro compasses or older standalone magnetic compasses
- CANbus, typically modern stand-alone magnetic compasses or GPS-compass
- Fastnet, from a compass previously fitted to a B&G network (such as Halcyon or Halcyon Gyro Compass with B&G processor) or a B&G Autopilot with compass connected

The source of the heading required can be set, its origin (T or M) selected and any alignment offset can be applied. Note that depending on selection, additional information will need to be input on the NMEA0183, CANbus or Fastnet webserver pages. It is important that T or M is set the same as compass output.

When a Simrad/B&G N2K compass is used then the compass swing can be initiated by manually entering the web-page /bandg.php where a dialogue to do this will then appear.

An offset may be added to the raw compass heading to fine-tune the relation between boat axis and sensor or tow accommodate where the compass sensor has to be mounted not-aligned with the boat axis at all.

Heel, Trim & Leeway

Heel & Trim

To access: Position/Attitude-Heel

- The ATP processor contains an inbuilt Heel & Trim sensor. Both can be configured via the Heel webpage.
- Alternatively, an external analogue clinometer can also be used.

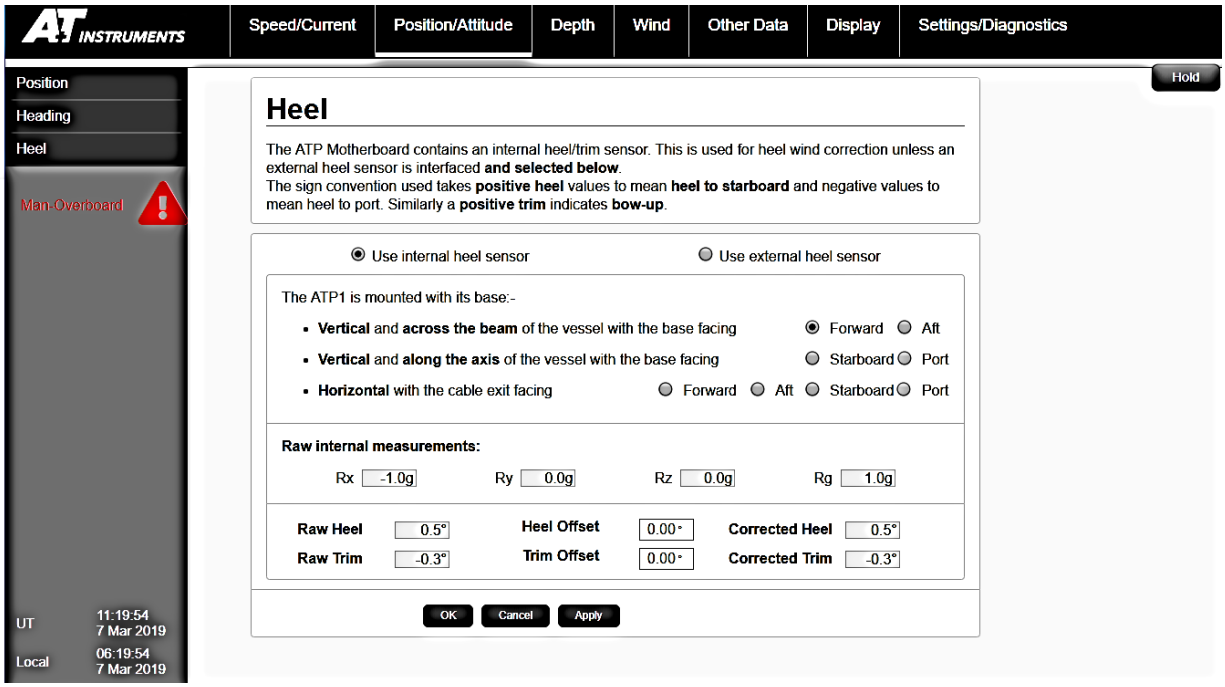


Figure 4-Heel and Trim Configuration Page

Leeway

To Access: Speed/Current- Leeway

- Leeway, in general, is calculated as: -

$$\lambda = K \times \text{Abs}(\text{Heel})/(Bs)^2$$

Where λ = Leeway in degrees, +ve results in course being larger than heading

Heel	In degrees
Bs	Boat speed in knots
K	Leeway factor.

- Typically, K is about 30 for a superyacht, 15 for an efficient cruiser/racer and near to 10 for a very efficient race yacht (all fixed keel). Canards, dagger-boards and foils can change this to the point where leeway can be negative (i.e. yacht climbs to windward of its heading). A negative value of K can be entered to reflect this.
- However, at low boat speeds, this approach can give rise to spurious estimates of leeway and derived values (including TWA.) Therefore, the ATP processor modifies the above with a weighting factor: -

Bs <2.5 kts:	W=0
2.5kts <Bs<5 kts:	W: linearly increasing from 0 to 1
Bs > 5 kts :	W=1

- Thus, the above calculations for leeway is used above 5kt and to a modified extent and speeds down to 2.5 kt. Below this speed, it is not possible to model leeway based only on speed and heel (apart from anything else boats may intentionally be heeled to leeward in light airs) so adopting a zero value for leeway gives a more stable estimate for wind calculations.

Wind

Apparent Wind Speed and Apparent Wind Angle Measurement

The webserver page shows the raw data from the masthead unit. Standard speed calibration for a B&G MHU are 1.04 for the pulse rate and offset. An angle offset for the MHU may be entered to correct fo alignment.

Heel correction should only be used if the heel set-up has been implemented correctly. The corrections applied if selected allow for the geometric correction for the heeled mast sensor.

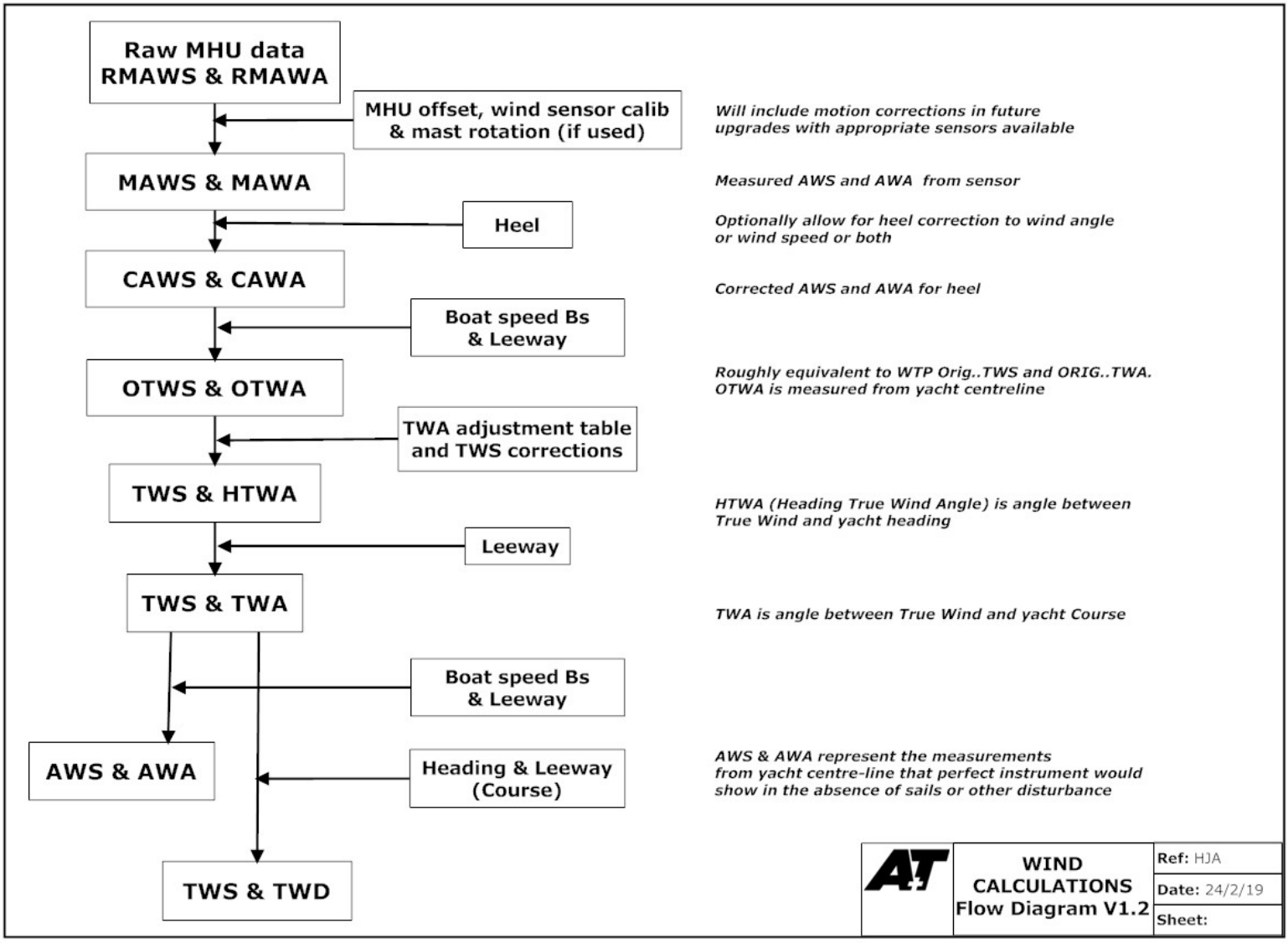
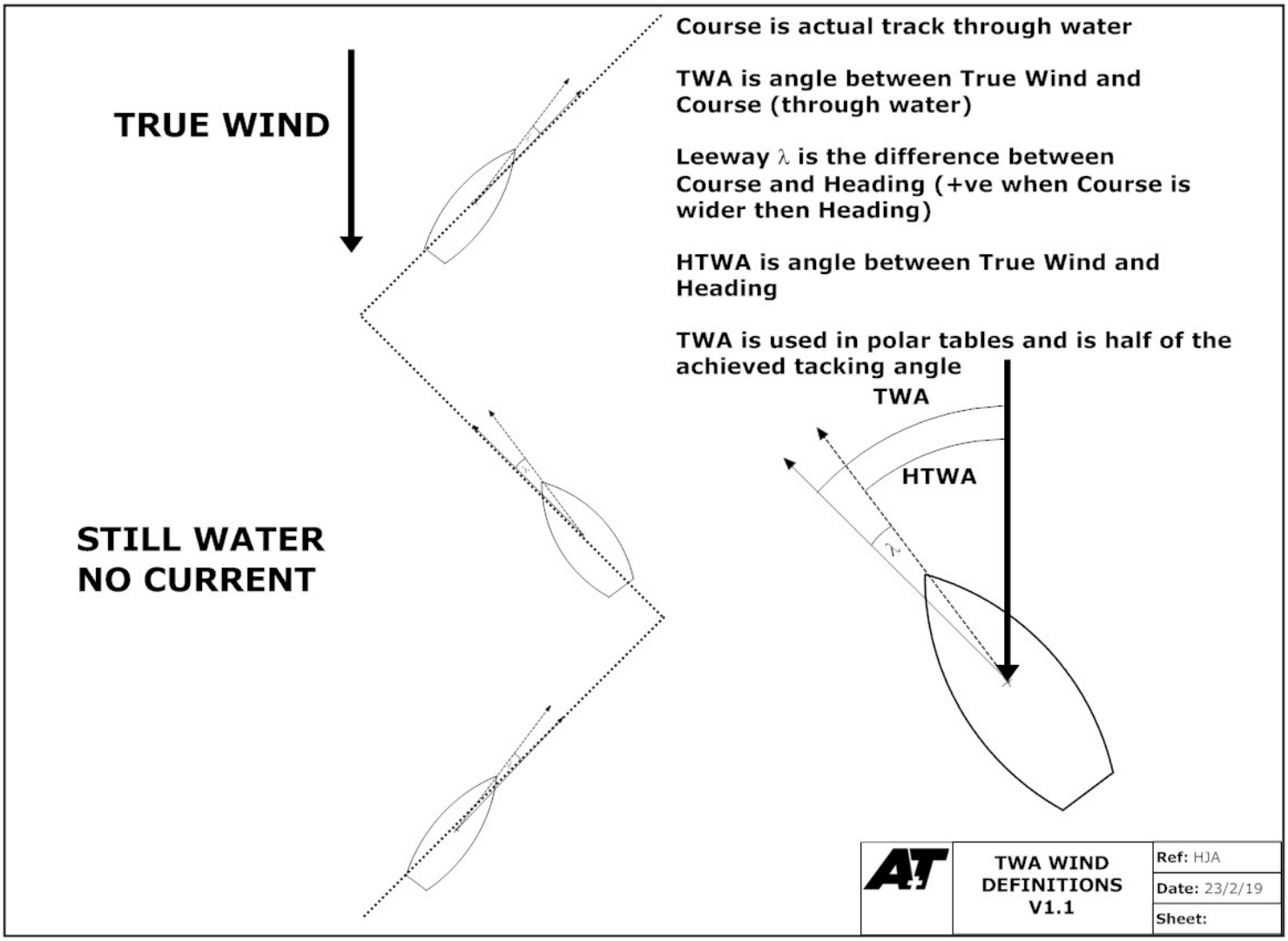


Figure 5-Wind Calculation Flow Diagram

The above diagram defines the terms and sets out the flow diagram for calculation. Note that TWA is the angle between the true wind direction and the yacht's course (so including leeway). If the user wants to ignore leeway, then this is achieved by setting the K value in the leeway settings to zero.

AWA and AWS are back-calculated to take account of the True Wind correction table.



Calibration

Wind angle calibration is a process of three phases: -

Phase 1

- Make sure that boat speed and heading is properly calibrated. Unless these are correct and consistent on all headings, speeds and heel angles, then any further calibrations are based on shaky foundations at best.

Phase Two

- Calibrate MHU offset. A basic setting can be achieved by motoring dead upwind in the lightest possible breeze and adjusting the MHU offset on the wind measurement page until this shows zero.
- The real test is if the AWA is the same upwind tack to tack with well-mixed wind and the same trim and boat speed on each side. Once this is achieved (adjust the MHU) then, the TWA should also be the same tack to tack.

Phase Three

- However, as the sails distort the wind field in the vicinity of the boat and other factors such as rigging induced mast twist come into play, the measured apparent wind angle will generally not be that which would be measured in the absence of these factors. The result is that the simple geometric calculation of TWA from the measured apparent wind will be wider or narrower than its actual value.
- This manifests itself in the TWD 'tacking' from tack to tack. If the calculated TWA is too wide, then the TWD will lift tack to tack and if too narrow it will head.
- This can be corrected by applying a correction to the measured apparent wind. However, it is not straightforward to see how much change in AWA is needed to correct the observed error in TWA. Instead the ATP, like other high-end performance instrument systems, allows for the TWA corrections to be entered directly and the apparent wind corrections are then back-calculated.
- The correction table provides for a range of wind speeds and entries for upwind, 90 deg reaching and downwind. As the upwind TWA on a TP52 in 7 knots is very different from that of a Perini, provision is made for entering the angles that should be considered upwind and downwind at different wind speed. Note that these are not polar values, just typical TWAs.

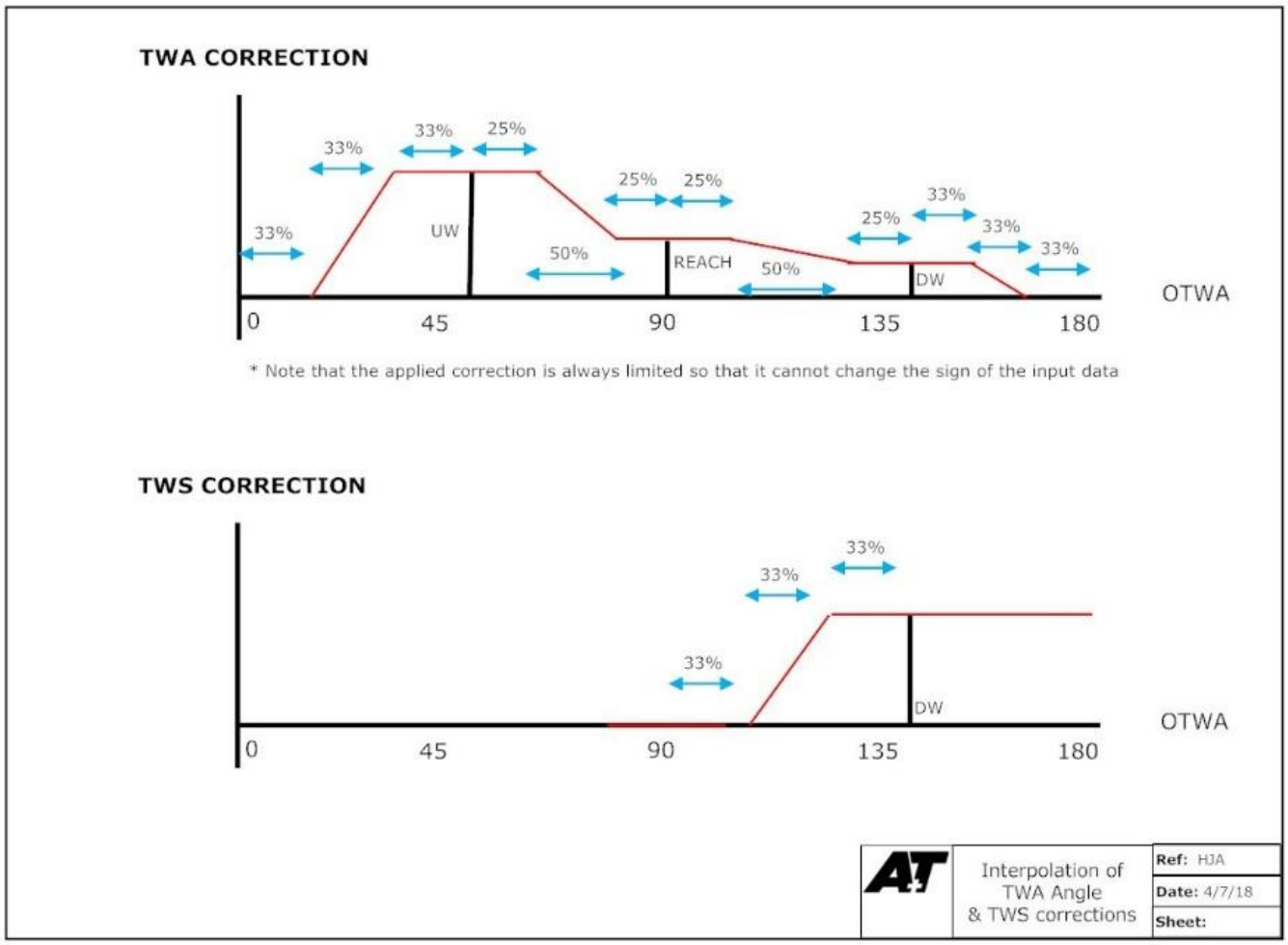
Advanced Calibration

OTWS		≤5kt	10kt	15kt	20kt	25kt	30kt	≥35kt
Upwind	OTWA	45	45	45	45	45	45	45
	TWA Correction	-5.0	-8.0	-10.0	-10.0	0.0	0.0	0.0
Reaching	OTWA	90	90	90	90	90	90	90
	TWA Correction	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Downwind	OTWA	145	135	145	145	145	145	145
	TWA Correction	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	OTWA	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0

Figure 6-TWA/TWS Calibration Table

- **If the TWD LIFTS from tack to tack, then REDUCE the TWA correction**
- **If the TWD HEADS from tack to tack, then INCREASE the TWA correction**

- It is also generally observed that the TWS overreads when sailing downwind due to the effect of the sail plan on the apparent wind speed measurement.
- The wind correction table allows for adjusting this with a default value of -10% applied at downwind angles. The interpolation scheme for this table is also shown below.



Interpolation scheme for TWA corrections

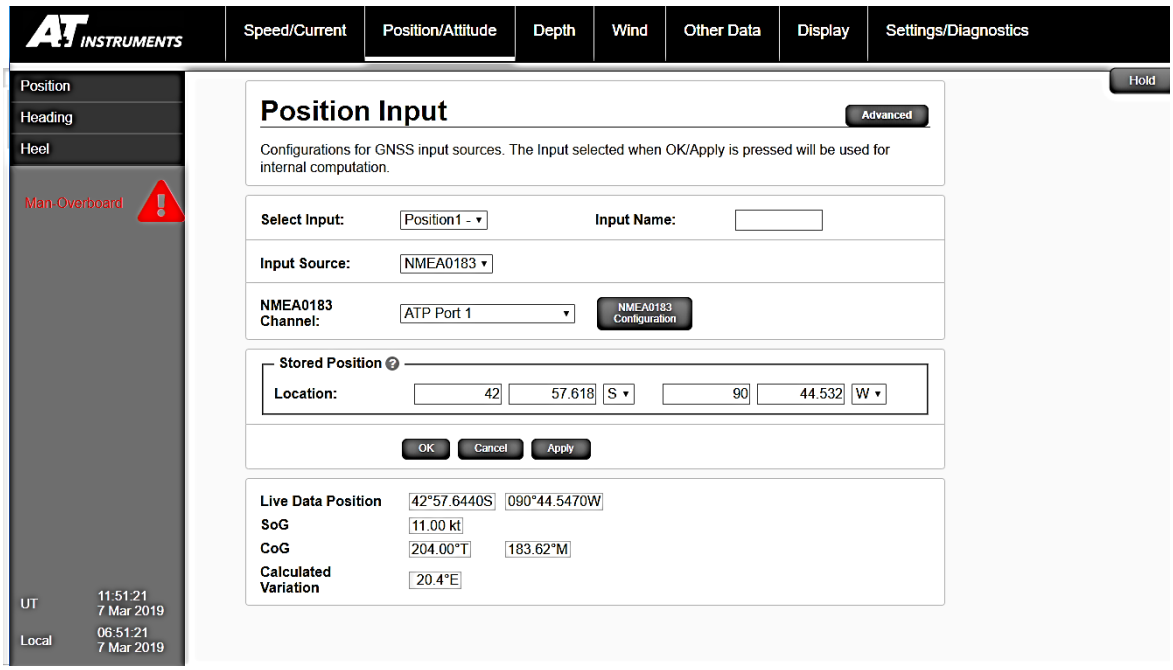
Position

The ATP is compatible with any GNSS sensor with NMEA 0183 output of position (GLL, GGA or RMC) and waypoint range and bearing (BWR, BWC, BER, BEC or RMB). It can also receive time (ZDA) and Cog/Sog (VTG or RMC)

GNSS systems using CANbus (N2K compatible) & Fastnet data protocols are also supported with custom sensor decodes available upon request.

Multiple GNSS sources can be connected simultaneously and are software selectable.

The Configuration page for GNSS sources and monitoring of live data is found in the Position/Attitude section.



GNSS Configuration page

Current

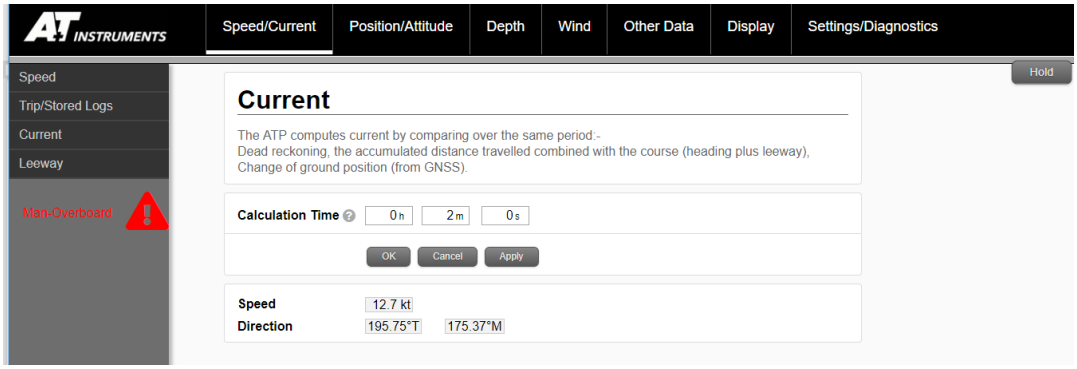
To Access: Speed/Current- Current

Current is displayed as two calculated variables processed over a specified time period.

The process compares measurements; Dead reckoning, the accumulated distance travelled combined with the course (heading plus leeway), and the change of ground position (from GNSS).

The time period for the calculation corresponds to the yachts geographical location and should be updated using the Calculation Time boxes in the Speed/Current, Current page.

1-2 Min	Solent
5-10 Min	Open Sea Tidal
30-60 Min	Oceanic



Current Configuration page

Two resultant variables, Current Speed (Knots), and Direction (Degrees) can be viewed in the live data boxes.

MOB – Man Over Board

To access: Home- Man Over Board

The ATP provides a stand-alone MOB function operating as follows:-

Triggering

A+T MFD Remote Button(s)

The installation wiring for remote connection is shown in the latest MFD manual. As the remote button is providing only a contact closure, more than one may be connected to any MFD in parallel. The MOB remote function must be enabled in the MFD NMEA0183 menu.

A+T MFD Menu key

Pressing the MENU key (bottom left) three times in succession will trigger the MOB state. Note the MFD must know the ATP processor is connected under MENU/System.

Contact closure connected to the analogue input to ATP

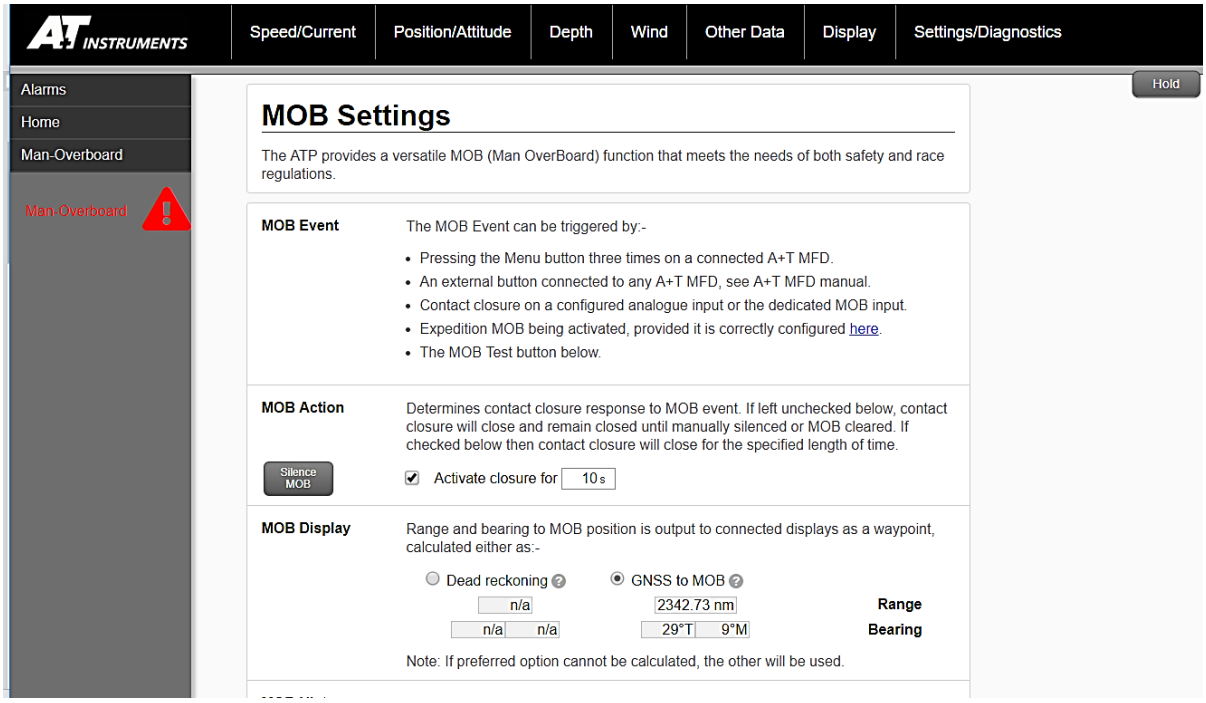
This is set on the webserver as MOB input under Other Data/Analogue.

Webserver

See the MOB page which is directly available from the Home page.

Expedition

If this is triggered either manually or through the Expedition interfacing functions, then this will force the APT into MOB mode.



Action

On activation, the following are initiated: -

The MOB relay on the ATP is closed and remains closed until SILENCED as described below. This can be wired as required to set off alarm(s) or even Jon buoy

Expedition, if running on a connected PC is forced into MOB mode.

MOB position, time and source is recorded and available on the webserver page.

Displays, if set up, are forced into MOB mode as described below.

Display

Any A+T MFD can be set to an '*MOB'* mode. Note that B&G displays on mixed mode systems cannot be set to provide this.
On MOB activation the display on the this (but not on other displays unless they are also selected as MOB) goes automatically to show range in meters and bearing in selected default display (True/Mag) mode as well as time in mm:ss since MOB activation.

If another page is selected on such a display while the MOB is still activated, then the new data will be shown just for 5 sec and then the display will revert to MOB again (this is so MOB information cannot accidentally lost)

This information is also available on the webserver MOB page.

Note that any B&G displays on a system will be unaffected and shall continue to show waypoint information as normal (so not MOB)

Calculation

The mode of calculation of range and bearing may be selected in the MOB page of the webserver to be either direct GNSS or Dead Reckoning. In areas of little or no current then the GNSS mode is more certain. If there is substantial current and the log and compass are known to be well calibrated, then the DR mode will compensate substantially for the current. The modes may be changed after the MOB has been triggered without losing the original MOB position.

Silencing & Clearing MOB

The MOB alarm may be SILENCED at any A+T MFD (so not just those selected as MOB displays) by pressing MENU twice and then selecting SILENCE. This still leaves the existing MOB position set and the selected displays forced to the MOB range/bearing/time display (so accidental fumbling of keys does not lose the MOB display at selected stations)

To clear the whole MOB status then at any MFD press MENU twice and then select CLEAR.

Both SILENCE and CLEAR can be set from the webserver page.

Clearing the MOB status on Expedition has no effect on the ATP MOB status.

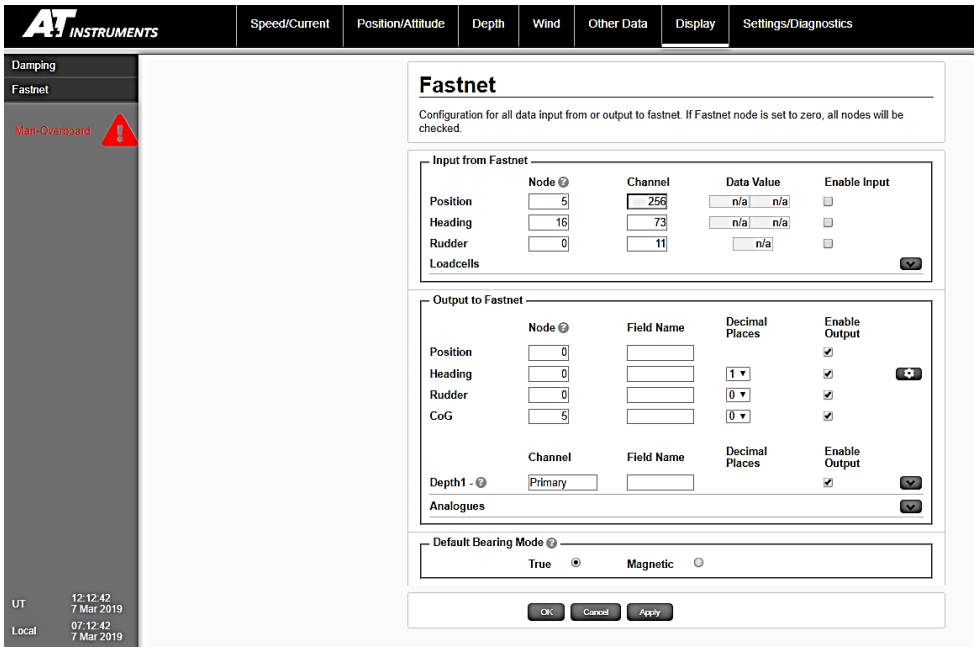
Reactivation of MOB

No new MOB activation can take place until the previous one is cleared as described above. A history of MOB events is available on the webserver MOB page.

Fastnet Data Bus Operation

To access: Display- Fastnet

The Fastnet databus delivers low latency channel system and information to the onboard network displays. In addition, it also serves as an interface tool, to source sensor information taken directly from the display bus. Management and configuration of this sensor data is via the Fastnet page, located in the Display menu.



Fastnet Configuration page

This page provides a list of the defined sensors and configuration options in order to send and receive data to the bus. Channel names, number of decimal places and the sensor node address is configured here, and the Live data boxes used to verify output data. All channels can be turned on or off via the enable checkbox.

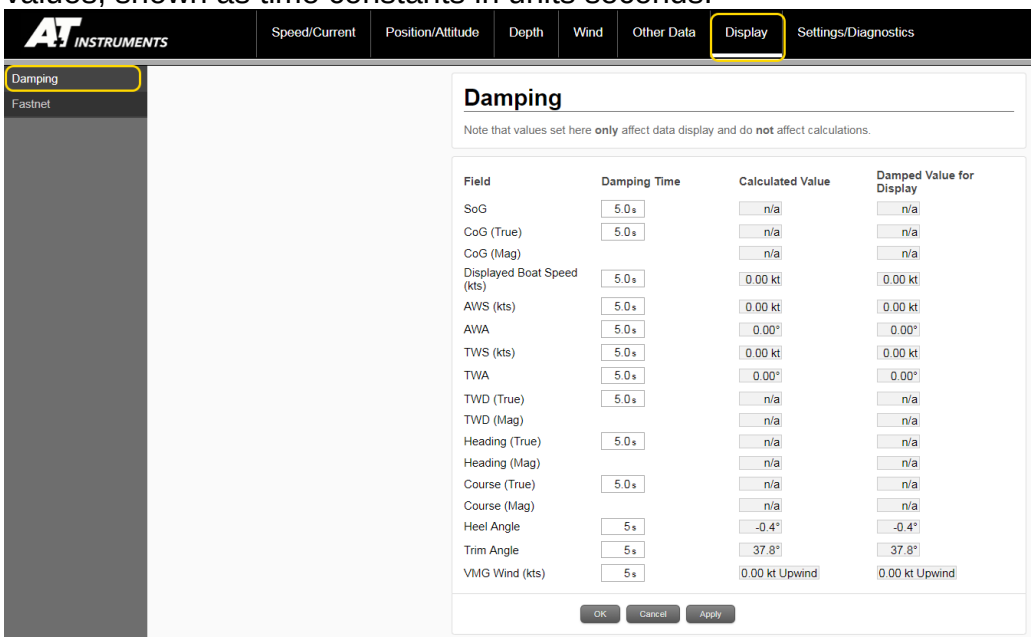
At the bottom of this page it is possible to select the default display mode as MAGNETIC or TRUE. This changes nothing I the operation of the system, but just defines the default displays for relevant data including Heading, Course, TWD, Current Direction, CoG.

Display Damping

To access: Display- Damping

The damping ratio or damping factor(s) are parameters used to characterise the frequency response for the channel data shown on the displays. Each parameter affects the displayed data only and does not influence the calculation or calibration value.

Under Field are the primary system channels and their respective damping values, shown as time constants in units seconds.



Once the damping time has been updated, you can verify channel data using the live data boxes. There are two data boxes for each channel; one shows the raw channel and the other the corrected damped output value. This can be useful when making multiple display changes and when a display is not clearly visible.

The A+T processor uses box car damping, averaging data equally weighted over the selected period.

Loadcells

There are three ways that load cell information can be linked into the ATP:-

Analogue 0-5v input

This is produced by a number of loadcell amplifiers including those made by Diverse and Tinley Electronics (DLA1). These can be interfaced using any of the analogue input channels on the ATP.

Fastnet Loadcell amplifier.

B&G for many years produced a loadcell amplifier which connected directly to the Fastnet bus and A+T make replacements for these (DLA2). On the Fastnet Display page it is possible to set up for the ATP to read loadcell data off the Fastnet bus for data logging and output to Expedition.

A+T ATP2 Loadcell amplifier

This connects directly to the ATP Ethernet bus..

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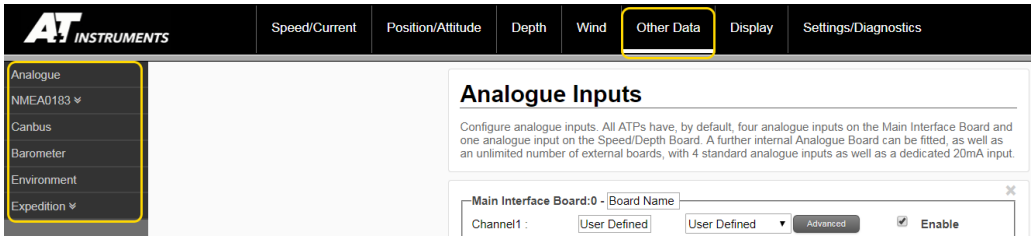
Other Data

Other data is a page dedicated to managing additional data sources and interface configurations.



Other Data Management page:

- Analogue – Configure analogue inputs differential sensors
- NMEA0183 – Setup communication between the listening and talking devices
- CANbus – Industry standard protocol used to interface devices field bus monitoring
- Barometer – Period selectable weather trends
- Environment – Supplementary weather sensors including air and sea temperature
- Expedition – Import and export channel management.

Analogue

To access: Display- Damping

The system is supplied with four analogue inputs as standard, with the option of adding additional inputs if required. In most cases, an analogue sensor comprising of a continuous voltage or mA sensor signal is used to measure physical quantities such as Displacement, Pressure and Temperature etc.

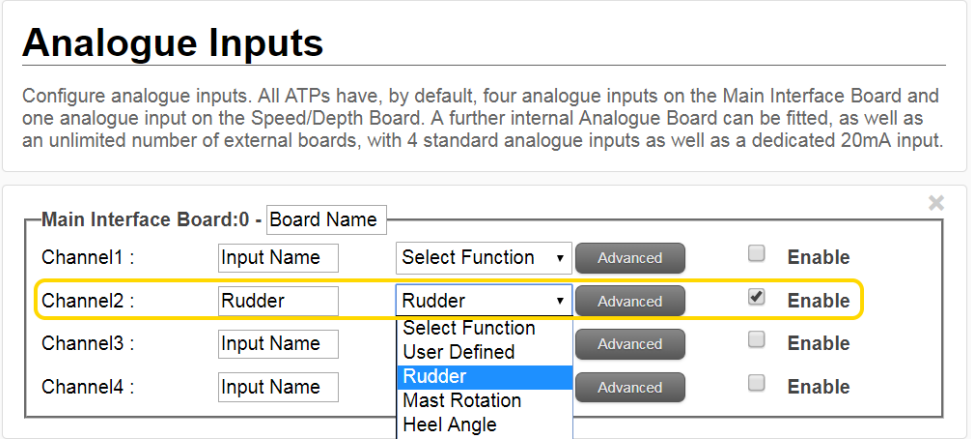
Each analogue input uses a 12-bit AD converter with an input signal range of; 0 – 5 V dc, 0 - 20mA or 4-20mA. There are two sensor excitation voltages options; 5 & 12V.

Analogue Sensor Setup

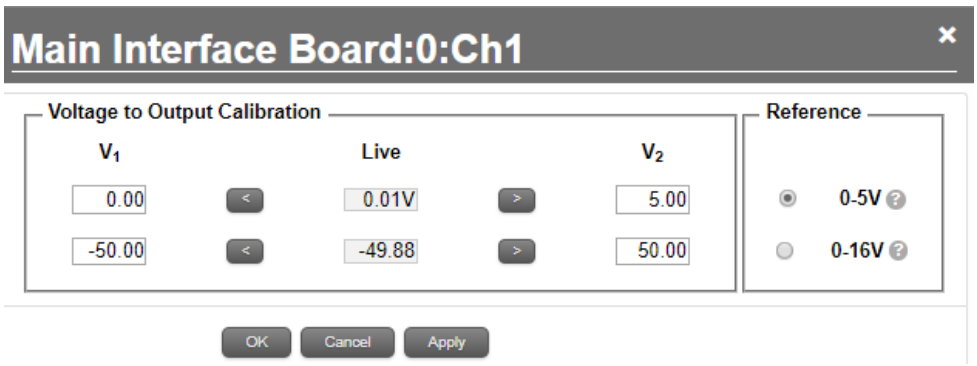
In the following example, you can create an angular channel using one of the analogue inputs. A rotary position sensor is used to demonstrate, and the sensor is assumed to be in the 0 – 5V range.

Setup

1. Go to **Other Data** and select **Analogue** group.
2. Navigate to the **Main Interface Board** for which the sensor is connected to.
3. In the **Channel Information** box name your new sensor, in this case it is **Rudder**, then select **Rudder** from the **Drop-down** arrow box.
4. Tick **Enable** and click on **Apply** to save these settings.
5. The output **Channel2** is now **Rudder,** with a default quantity **Angle** and units **Degrees.**
6. Now click on the **Advanced** box to start the calibration process**.**



The Calibration (‘Advanced’) page is divided into two rows. Top centre is the **Live** box that shows the current value of the raw input to the calibration. The **Arrows** to the left and right are function buttons that will sample the current value and populate the adjacent boxes with the live value.



The second row features the actual calibration value and the two known reference positions. The two **Arrow** function buttons operate identically to the ones above, sampling the current value and populating the adjacent **Value** boxes with the live value.

Reference

0-5V: Ratiometric input reference

In many pressure sensors the electrical output signal depends on the supply voltage. This is a common feature for unamplified sensors and sensors that do not have built-in regulated power supply such as potentiometers and level sensors.

0-16V: Absolute Input Reference

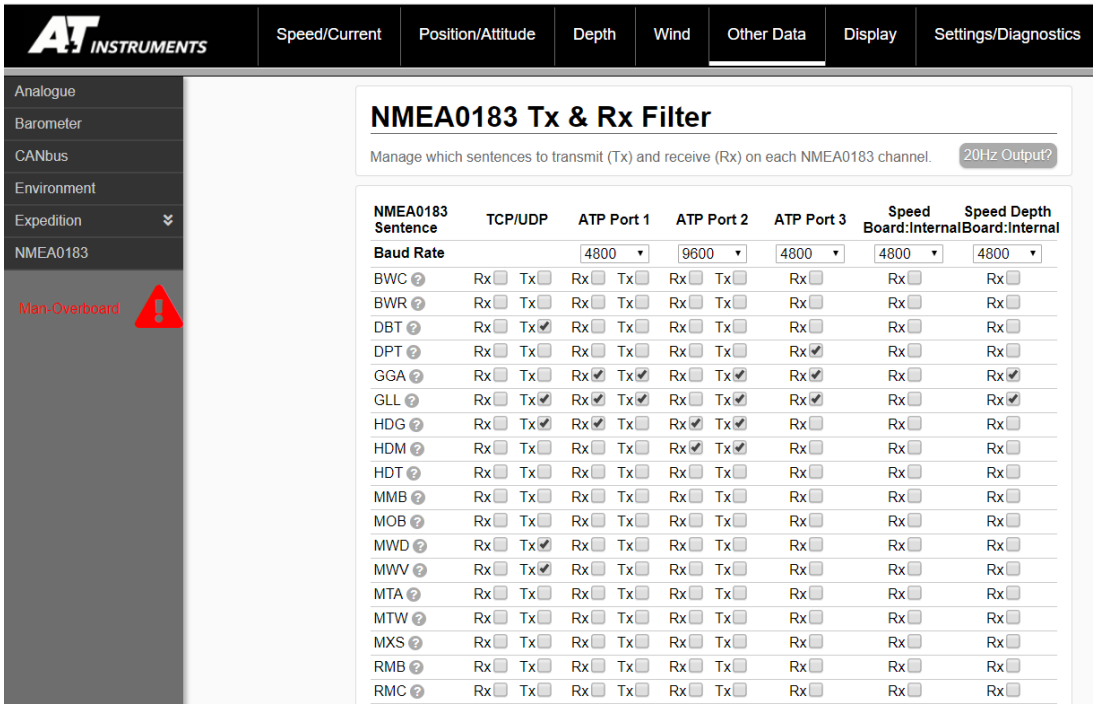
For sensors with built- in regulated power supply, or supplied from a source other than the ATP, where any variation of the supply will have no effect on the sensor output. NOTE: This input reference should still be chosen for 0-5V sensors with built in regulators.

NMEA 0183

To Access: Other Data- NMEA 0183

NMEA serial communication is in ASCII format with the data divided into packets shown as ‘sentences. The NMEA page lists all the sentences by their abbreviated name and provides control options to manage each sentence individually

From here it is also possible to adjust the baud rate for each port.



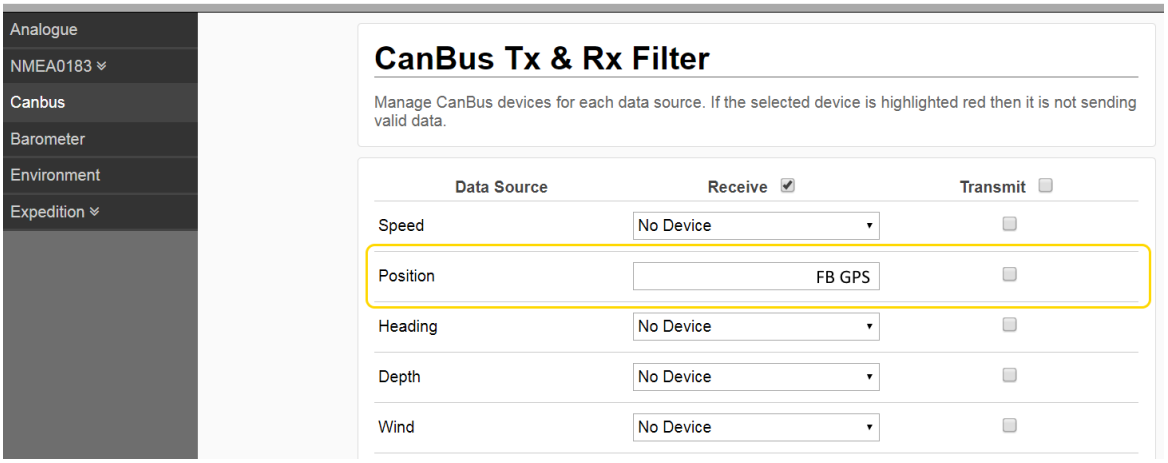
CANbus

To Access: Other Data- CANbus

CANbus can be used as a high-integrity data bus for networking devices and data logging. The ATP is N2K compatible and supports other devices and microcontrollers using the CANbus protocol.

The Tx & Rx Filter page is used to select the CAN data sources to Send, Receive or Ignore.

Internal error checking will highlight the channel red if the received data source is not valid.

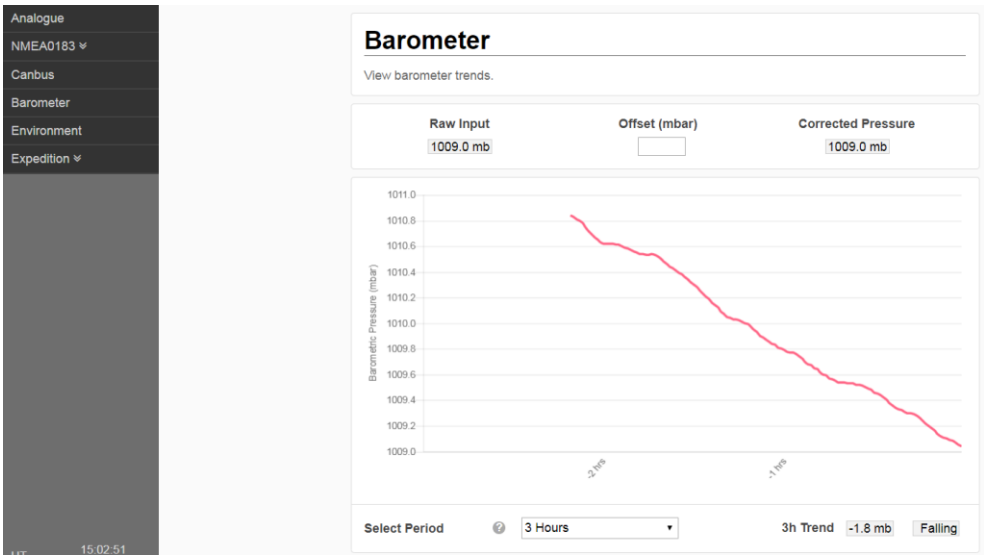


Barometer

To Access: Other Data- Barometre

The ATP has an inbuilt Barometric Pressure sensor. Pressure data is displayed in a 2D graph to allow easy tracking of trends in the weather change.

The **Select Period** drop-down box is used to adjust the displayed data range period, from 3 hours to 3 weeks. Corrections are applied using the Offset box located.

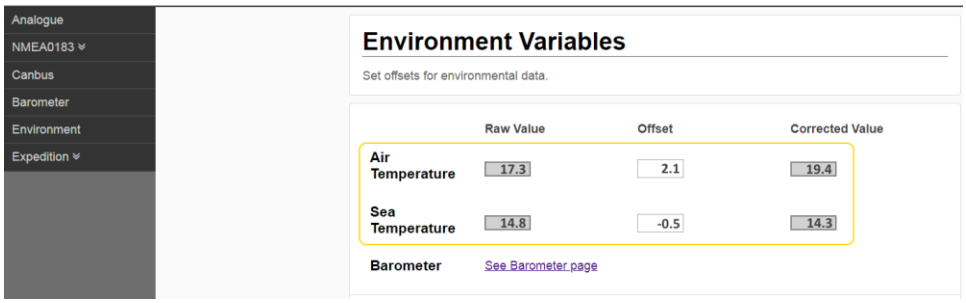


Barometer Pressure Monitoring

Environment

Sea & Air Temperature

An air temperature sensor can be connected to any of the analogue input channels and configured and calibrated in the Other Data/Analogue page. Sea temperature is sourced from the speed sensor (paddle wheel type) if fitted.



Air and Sea Temperature Sensors

Expedition

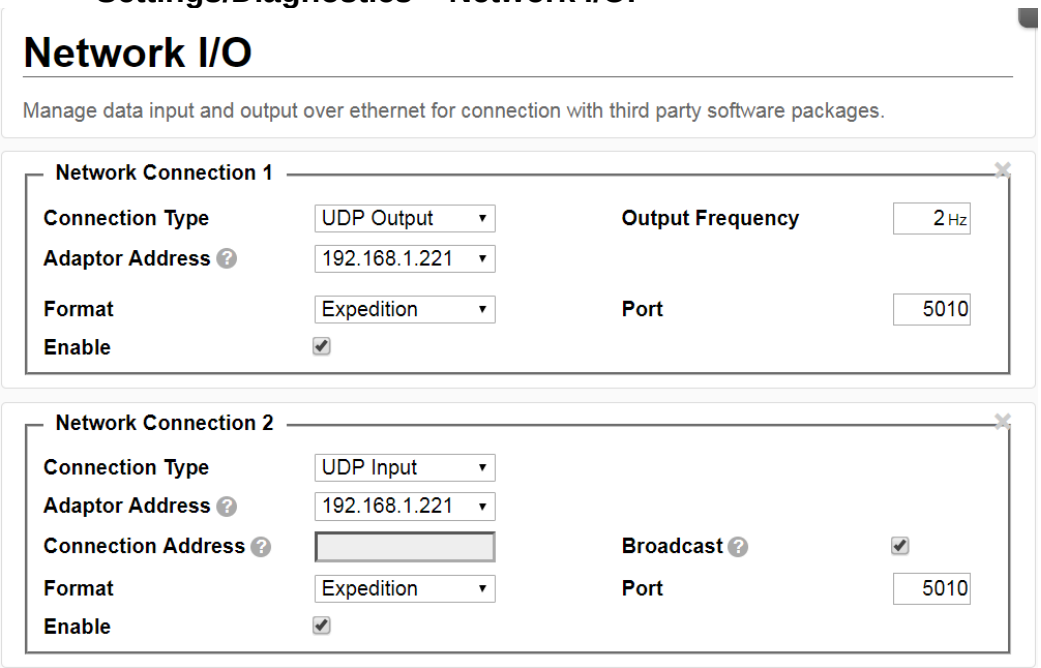
Connection

A UDP connection method provides a simple and intuitive interface between Expedition and other third-party software packages. Fast, bi-directional data transmission allows easy access to channel variables, calibrations and custom user channels.

The Connection can be direct via ethernet or wireless via a router depending on the network arrangement.

Setup - ATP

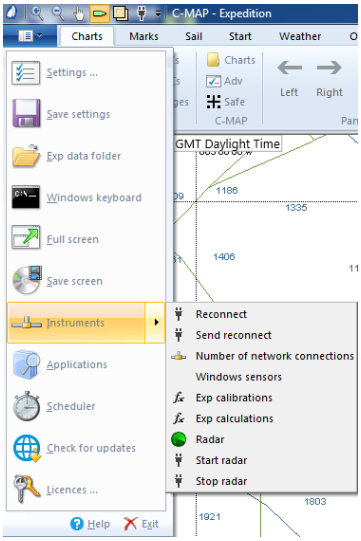
1. To Configure the UDP connection for use with expedition, go to; **Settings/Diagnostics > Network I/O.**



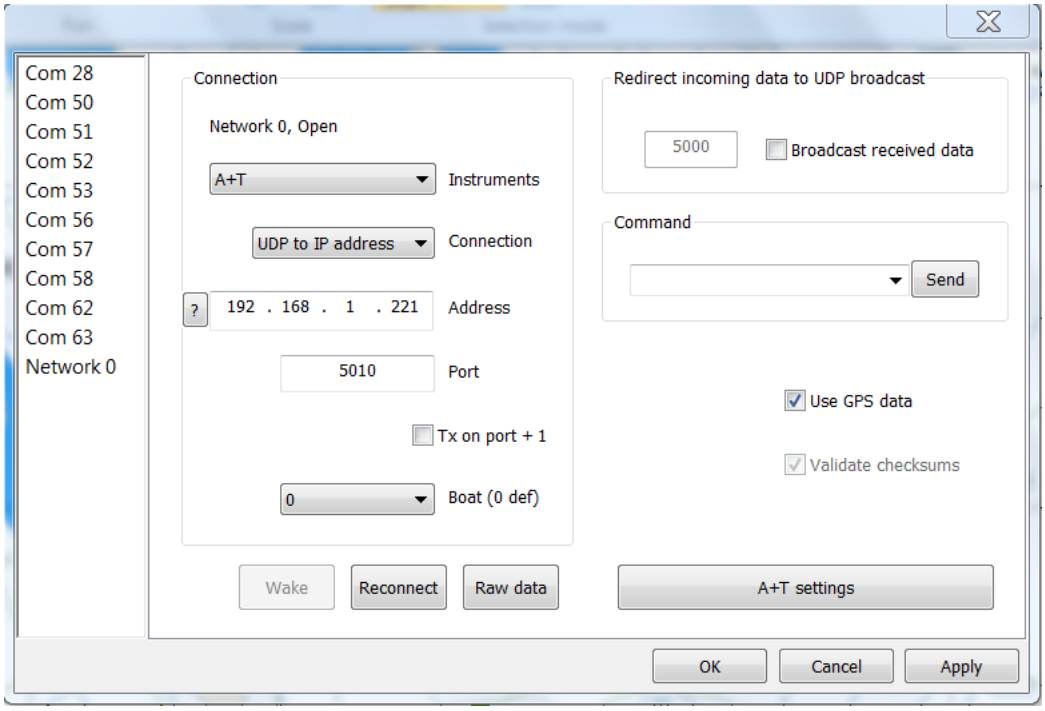
2. Add a second network connection.
3. Set Connection 1 to UDP Output and Connection 2 to UDP Input.
4. Ensure both the enable and Broadcast checkboxes are ticked: ***Note**: If unchecked, you can specify the IP address to Send & Receive UDP data.*
5. Enter the IP address for the local connection in the Interface box.
6. Select Expedition as the Format.
7. Enter a valid UDP Port number and choose and a suitable Output Frequency between 1 and 10 Hz.
8. Click apply or ok to save the configuration.

Setup - Expedition

1. To configure Expedition for use with the ATP, click on the drop-down menu  and select **Instruments**

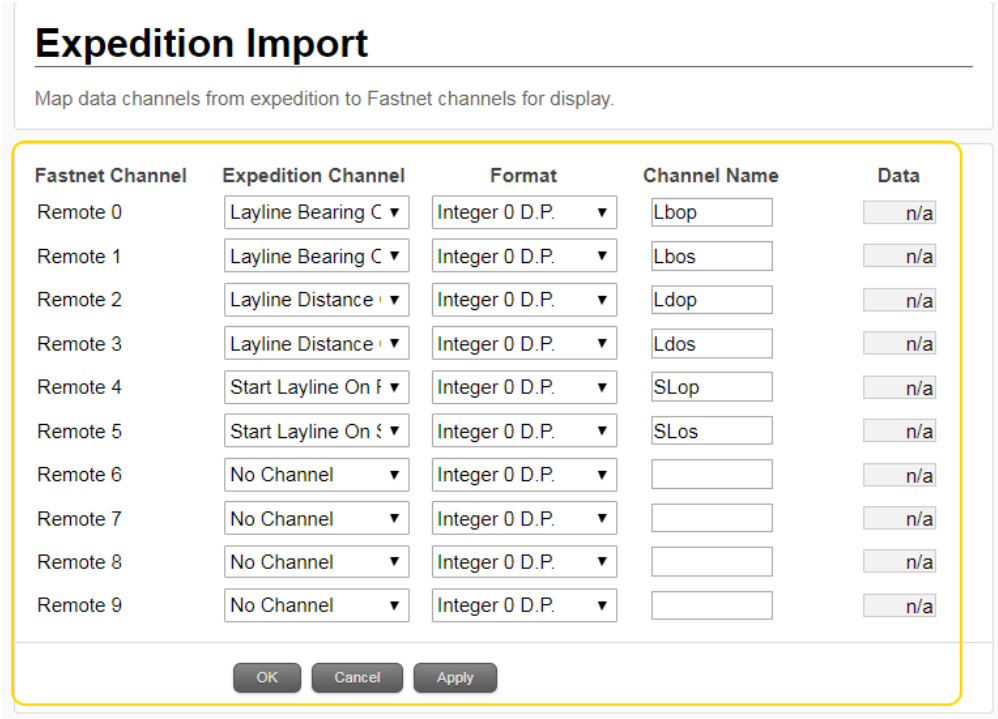


2. Select **Network 0**.
3. Select **A+T** from the dropdown list.
4. Select **UDP to IP** from the connection's dropdown list.
5. Enter the ATP IP Address and Port Number.
6. Check **Use GNSS Data** and **Validate Checksum**.
7. Click **OK**.



Expedition Import

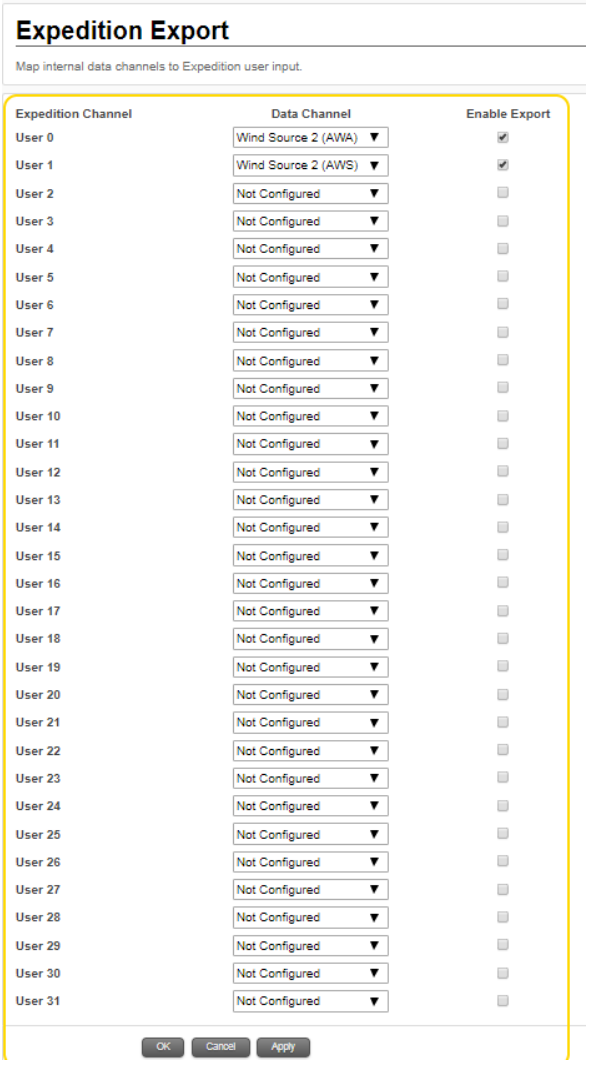
There are 10 remote Fastnet channels assigned to Expedition. These channels allow you to source Expedition variables and re-map them to the Fastnet display bus. Select the channel variable and the displayed data format using the drop-down list.
The channel data can be verified using the live data box.



Expedition Import Channels

Expedition Export

There are 31 User channels assigned to Expedition. These are used to map ATP sourced channels to Expedition by selecting the data from drop-down list and enabling the export checkbox.



Expedition Export Channels

Advanced Settings, Setup & Diagnostics

Processor time settings

To Access: Settings/Diagnostics- System Time

The processor may have UT (& date) set up manually or it may be set to synchronise from an external system such as GNSS.

If synchronisation is selected, then: -

a) Ensure that a timing input is enabled (currently NMEA0183 ZDA or N2K)
b) Do not select more than one-time input as enabled or sources could conflict

To ensure stable synchronisation, the ATP processor uses the following schema: -

No synchronisation is undertaken until 1 minute after the later of:-

- Processor startup
- First reception of external timing data
- The synchronisation option is selected

Thereafter, a full minute of valid timing data must be received.

Only once this condition is met will the ATP synchronise UT (including date) with the external source and make an entry into the Logs log file (see Settings/Diagnostics)

Thereafter the ATP continues to monitor the timing offset and will only re-synchronise its time when both the ‘1 minute’ condition above is met and the processor date has changed from the last time a synchronisation change took place.

Thus, once initial synchronisation has taken place then no change to the time will be made more often than once every 24 hours

If synchronisation is wished to be forced, then this can be accomplished by deselecting and then reselecting the synchronisation tick box and waiting for a minute as above. If synchronisation does not take place, then check that valid timing input is available and selected.

Appendix A Software Updating and Configuration

These are both accessed from the Settings/Diagnostics area of the webserver.

A1 Configuration

To Save Config: Go to Settings/Diagnostics- Saved Config. – Config Name Save

The whole configuration which includes input and output settings, calibrations can be saved and reloaded.

It is recommended to do this from time to time during commissioning and again once a final operating state has been reached.

The saved configurations are stored internally on the processor. They may also be exported and imported to the host computer.
A FACTORY RESET is also available from this area. Naturally, this should be used with caution. All data apart from the IP settings and Overall Log are set back to the state in which the unit was originally shipped.

A2 Software updating

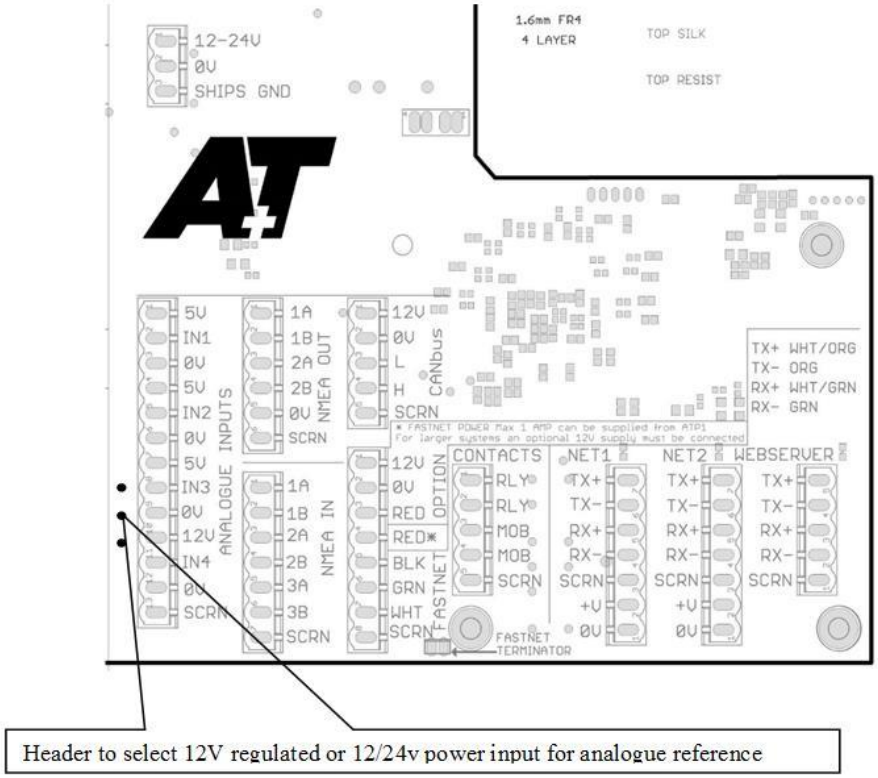
To Update: Go to Settings/Diagnostics- Software Upgrade- Choose Zip File- Upload Software- Upgrade now

The latest software update is available on the A+T website under Downloads. Download and save the ZIP file but do not unzip it.
Select the entire ZIP file to be uploaded on the webserver. The upload is almost instantaneous, and the new version should be displayed. The processor restart automatically with the new version; there is no need to power cycle after upload.
The configuration settings are preserved during an upgrade but is it still prudent to save the configuration as above before upgrading.
An advanced upload is also available here. This is to allow the uploading of firmware to the processor motherboard and other interface boards connected on the internal A+T ethernet. This section should only be used under direct instruction from A+T.

Appendix B Hardware Installation

B1 Motherboard

Processor motherboard connections



Notes: -

Power

Connect either 24v or 12v power through a 5A fuse or circuit breaker to the ATP power terminals.

Screen Connections

Connections for the screen are provided on each connector. All screen connections are joined inside the unit and connected to the Ship's Ground terminal on the power connector.

The ATP Ship's Ground terminal should either be left disconnected or connected to Ship's Ground. It **should not be connected** to the power 0V.

Screen connections should not be connected on NMEA0183 inputs. They should be connected on NMEA0183 outputs only.

Fastnet Connection
Connect the white, green, black and screen of the Fastnet network cable as marked

An in-built 100 Ohm resistor is mounted at the bottom of the Fastnet connector which is active when the header is in place. This should be used when the processor is at one end of the Fastnet Network. Total terminator resistance on the Fastnet Network should be close (+/- 10%) to 50 Ohm.

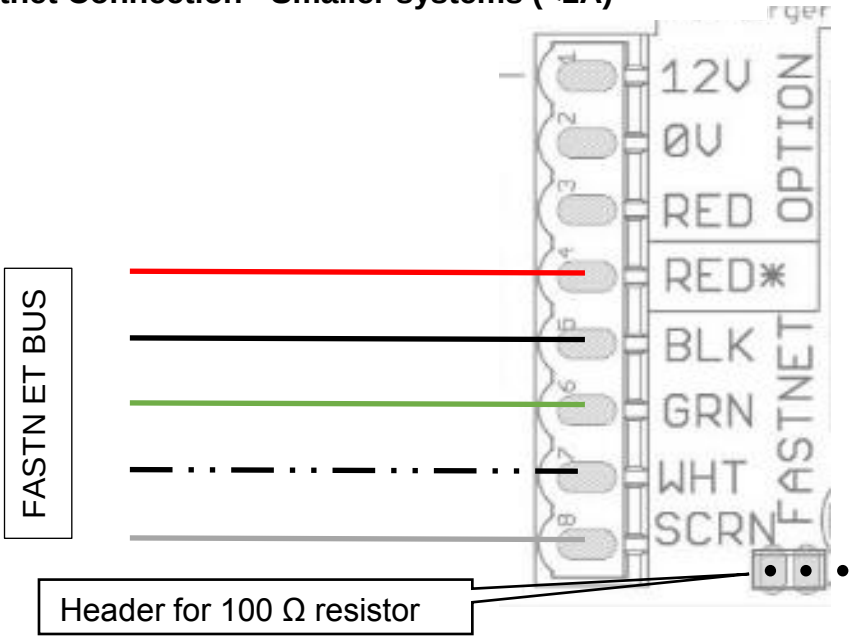
For the red connection then see notes below: -

When any B&G displays, sensors, interfaces or other 12V only units are to be connected to the Fastnet network, then this must be supplied with 12V. If only A+T displays and interfaces are used, then 24V may be used.

Two options for providing 12V power to Fastnet are available: -

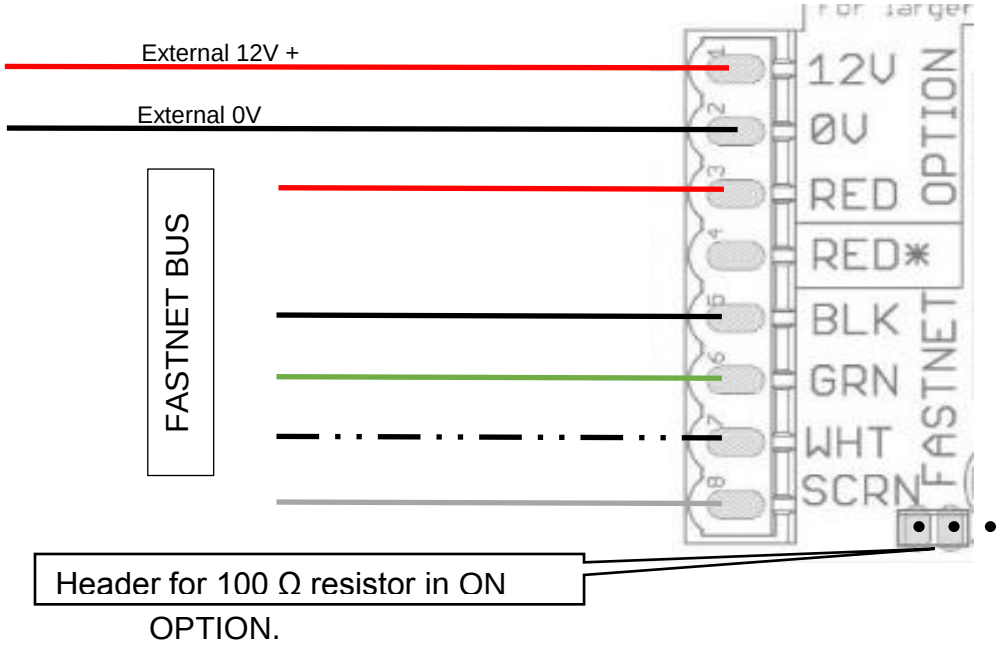
1. For a small system not drawing too much power (up to 1 amp, typically less than 6 displays) then power may be taken from the Processor Fastnet connector marked RED*.

Fastnet Connection - Smaller systems (<1A)

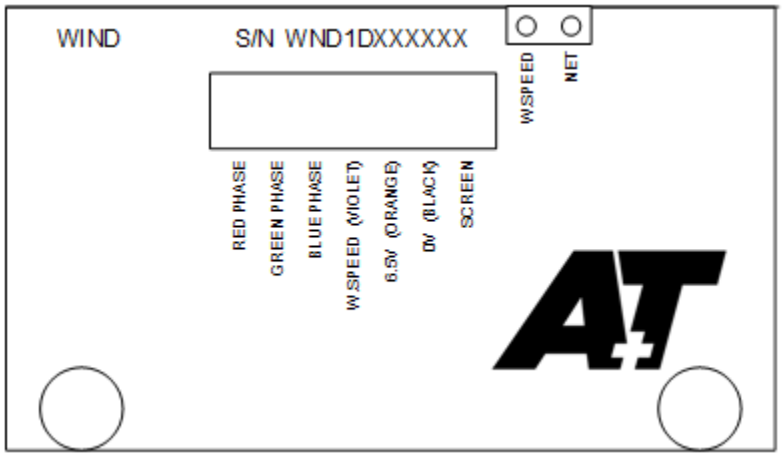


2. For a larger system the Fastnet red should be connected to the RED terminal immediately above this marked 12V OPTION and a 12V external power source with a 5A fuse or circuit breaker should be connected to the connecters marked 12V and 0V

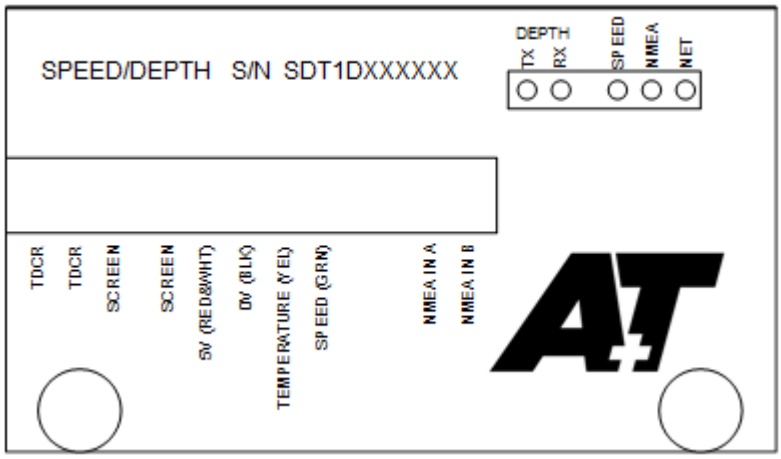
Fastnet Connection - Large system (>1A)



B2 Wind Board



B3 Speed/Depth/Water Temperature Board



Appendix C Commissioning Checklist/Short Guide

Start up

Item	Activity	Notes
Power up	Check processor, motherboard LEDs come on and small LCD display working	Boot time should not be more than 22 sec
Connect a computer with Ethernet cable	Get webserver working	Set IP address and mode
Connect Fastnet	Check displays showing time or barometric pressure (always output)	Check how Fastnet is powered (12v). Check network resistance. Is APT1 100 Ohm resistor fitted/needed

Boat Speed, Wind Speed, Heel & leeway

Item	Activity	Notes
Connect paddle wheel	Spin & check pulses on speed page.	Set Hz calibration to the previous value if known
Connect wind sensor	Check mast volts up and down on Wind Measurement page Check pulses coming from speed senor	
Calibrate Wind	Set up MHU offset and wind correction table as normal.	Check Leeway and heel set up first
Heel	Set up mounting orientation	
	Check output sensible	
Leeway	Set the best-known number	If a sailing vessel, else 0

NMEA 0183 Inputs, GNSS, Depth & Gyro

Item	Activity	Notes
Connect Input	Verify expected data on NMEA 0183 Diagnostics Page	
Set Filter	Webserver/Other Data/NMEA0183/Filter	Set to take in required information
GNSS	Webserver/Position. Select correct input port and verify data received.	
Gyro/Compass	Webserver/Heading. Select correct input port and type of input data True/Mag.	Verify data received and set any offset.
Depth	Webserver/ Depth. Select input port and name it if required.	Set datum offset
Outputs	Set baud rates	
	Select data to be sent on filters page	

Analogue Inputs

Item	Activity	Notes
Reference Voltage	Select header for regulated 12V or input power voltage on the 12V reference	
For each input	Select pre-defined or user	Check & calibrate
MOB	Note must switch 12v reference to input channel for correct operation	

Fastnet Settings

Item	Activity	Notes
Reference Voltage	Select header for regulated 12V or input power voltage on 12V reference	
For each input	Select pre-defined or user	Check & calibrate
MOB	Note must switch 12v reference to input channel for correct operation	

Alarms/MOB, Set from webserver Home Page

Item	Activity	Notes
Alarms	Select levels, mode and enable as required	Can close relay for connection to plc or sounder/light
MOB	Set up as required	Can close a separate relay for connection to plc or sounder/light
A+T MFDs	Set to show MOB as required Set to show connected to ATP processor under MENU/System	TEST MOB SYSTEM

CANbus (N2K compatible)

Item	Activity	Notes
inputs	Select source for data that is available on the N2K	
Outputs	Select data groups for output data from ATP	

Appendix D ATP1 Mounting Template

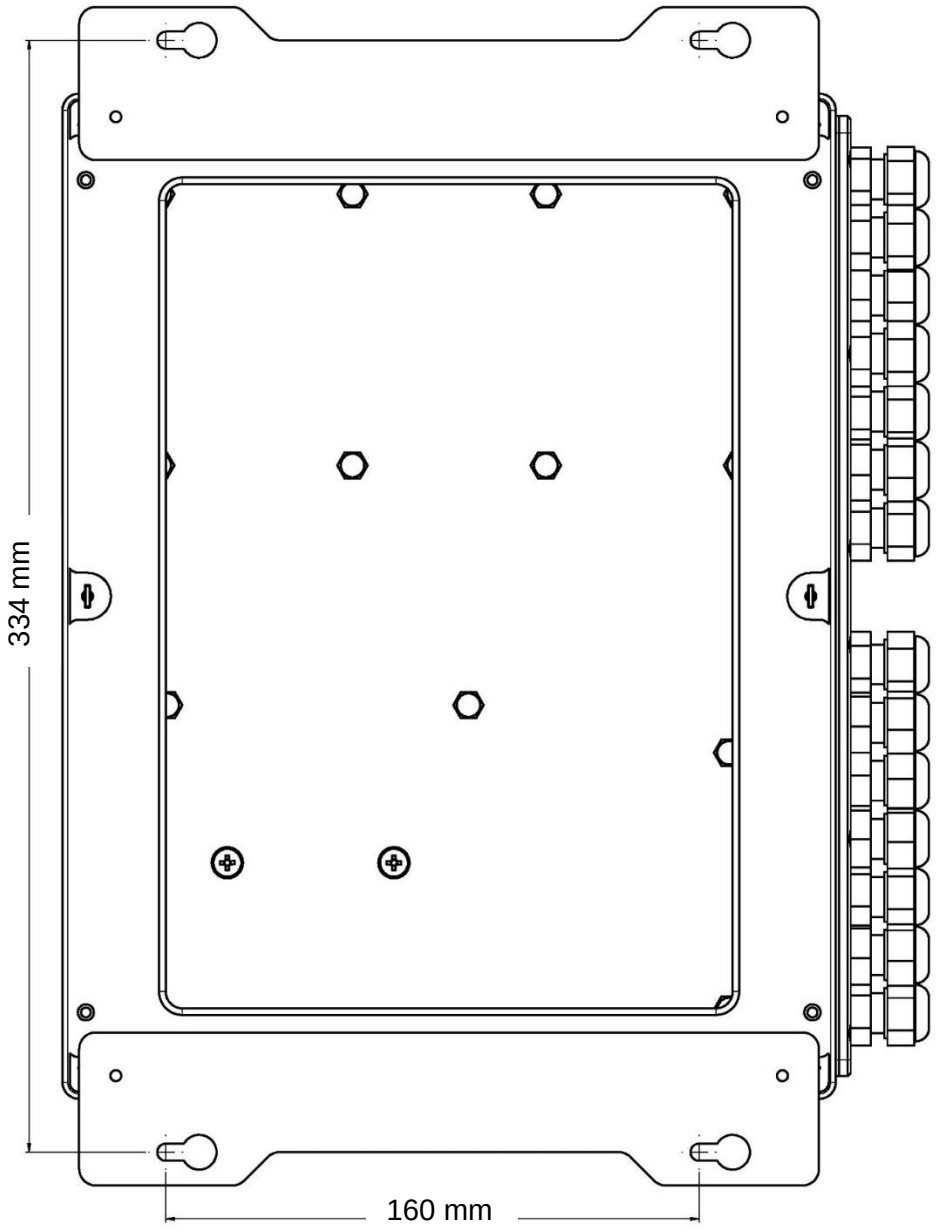


Figure 7- NOT TO SCALE

Appendix E- NMEA Sentences

BWC	Bearing and Distance to Waypoint (GC)
BWR	Bearing and Distance to Waypoint (RL)
DBT	Depth Below Transducer
DPT	Depth of Water
GGA	Global Positioning Fix Data
GLL	Geographic Position Latitude/Longitude
HDG	Heading- Deviation & Variation
HDM	Heading- Magnetic
HDT	Heading – True
MMB	Barometric Pressure
MOB	MOB Active Sentence
MWD	True Wind Direction and Speed
MWV	True / Apparent Wind Angle and Speed
MTA	Air Temperature (Legacy)
MTW	Water Temperature (Legacy)
MXS	MaxSea Proprietary MOB Sentence
RMB	Recommended Minimum Sentence B
RMC	Recommended Minimum Sentence C
ROT	Rate of Turn (Deg/min)
RSA	Rudder Sensor Angle
RTE	Route List
VDR	Current Rate and Direction
VHW	Water Speed and Heading
VLW	Distance Travelled through Water
VPW	Speed- parallel to wind (VMG)
VTG	Track made good- ground speed (COG/ SOG)
VWR	Relative Wind Speed and Angle (Legacy)
VWT	True wind speed and angle (legacy)
WPL	Waypoint List
XDR-A	Transducer Measurement
XDR-B	Transducer Measurement (Legacy B&G format)
XTE	Cross Track Error
ZDA	Time and Date

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