INSTRUMENTS

ATPX Operating Notes V0.3

For: ATPX Software V1.2.3 and higher

Sept 2023

A+T Instruments Ltd
Lymington, UK
Tel: +44 1590 718182 (24/7)
www.AandTinstruments.com
info@AandTinstruments.com

Disclaimer

A+T Limited makes no representation or warranties of any kind whatsoever
with respect to the contents and specifically disclaims any implied warranties of merchantability or fitness for any particular purpose. A+T Instruments Ltd (A+T) shall not be liable for any errors contained herein or for incidental or consequential damages in connection with the furnishing, performance or use of the hardware, associated software, or this written material.
A+T reserves the right to revise this publication from time to time, and to make changes in the content without obligation to notify any person of such revision or changes.
A copy of the A+T Conditions of Sale is available on request and includes a declaration of the warranty and limitation of liability which apply to all A+T products and services.

Health and Safety information

Under the terms of European and UK Health and Safety Legislation, A+T Limited is required to classify any hazardous materials in the products it supplies and to provide relevant safety information to users.
Any hazardous materials in A+T products are clearly marked with appropriate symbols. Product Safety Data Sheets relating to these materials are available on request.

Trademarks

A+T is a registered trademark within the UK and European Union.
B&G is a registered trademark of Navico within the UK, European Union and North America.
Expedition is a registered trademark of Tasman Navigation within the UK and European Union.

Conformity

The ATP Processor and interface cards and displays comply with the CE EMC directive 2004/108/EC and Level 2 of the Radio communications (Electromagnetic Compatibility) standard 2008.

CE

1. Introduction

The ATPX is an advanced version of the ATP1 and ATP2 systems offering much greater user control and customisation. The flow-based programming tool Node-RED provides a visual method of customising the ATPX, making it accessible to users and installers without a dedicated programming background. The ATPX also introduces support for the MODBUS over TCP/IP protocol, allowing direct communication with PLCs and similar boat control systems.

The core functionality of the ATPX remains consistent with the A+T processor family, though the webserver interface has been streamlined with the newer generation of A+T products. A baseline system including Speed/Depth/Wind/Position and Heading can be configured following the latest ATP user manual using only the webserver.
Importantly the system can be returned to this baseline configuration at any time, disabling any custom behaviour, in the event of errors.

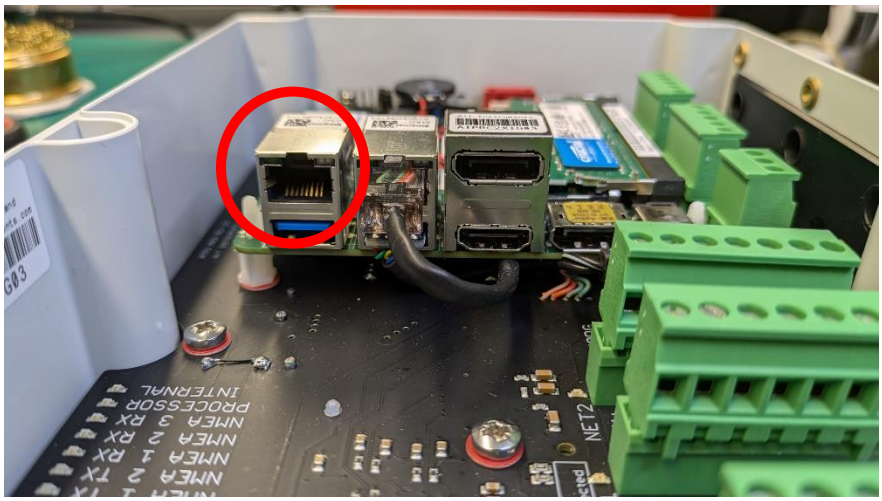
The ATPX offers both ATP1- and ATP2- hardware configurations and continues to support the core data connections of the existing processor. Through Node-RED it can also work with other user-specified protocols, such as MQTT, providing forward compatibility and futureproofing.

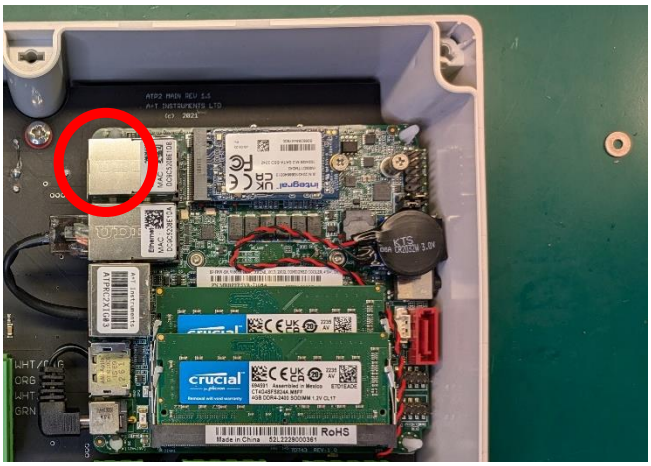
2. Connectivity

The ATPX continues to support the core data bus connections of the ATP1 & ATP2; **Ethernet, Fastnet, CANbus (N2k compatible)** and **NMEA0183** devices can be connected through the dedicated interface board.

An additional ethernet port is provided for MODBUS over TCP/IP connections, ensuring that critical systems are kept separate from both internal data and the general traffic on the boat network.

This connection is via a RJ45 connector plugged into the processor board as in the photographs below:-





Configuration including IP address of the MODBUS port is covered in section 5 below.

3. Webserver

The webserver remains central to commissioning, calibration and diagnostics of the ATPX. It is recommended that the ATPX is connected to the boat network via the port labelled *WEBSERVER* on the interface board. This allows access from any ethernet-enabled device on the boat network through a web browser. See the ATP1/2 manual for detailed instructions.

Node-RED also provides a graphical interface from web browsers, which can be reached directly from the ATPX webserver.

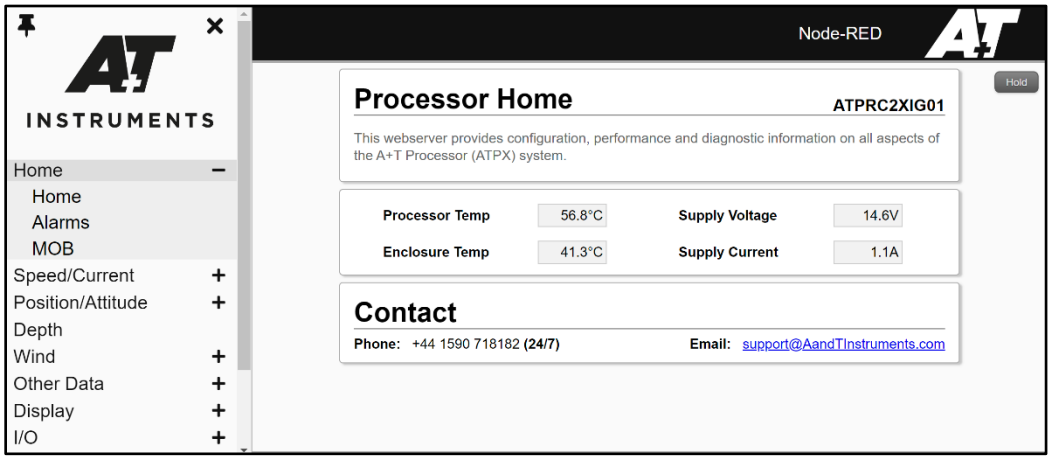


Figure 1: The ATPX Webserver Homepage

4. Node-RED

Node-RED is a flow-based programming tool, originally developed by IBM's Emerging Technology Services team. Thorough documentation is available at https://nodered.org/ and new users may find https://nodered.org/docs/tutorials particularly useful.

Node-RED provides users the ability to import and manipulate processor variables and export custom data to the display network, Modbus or to Expedition.

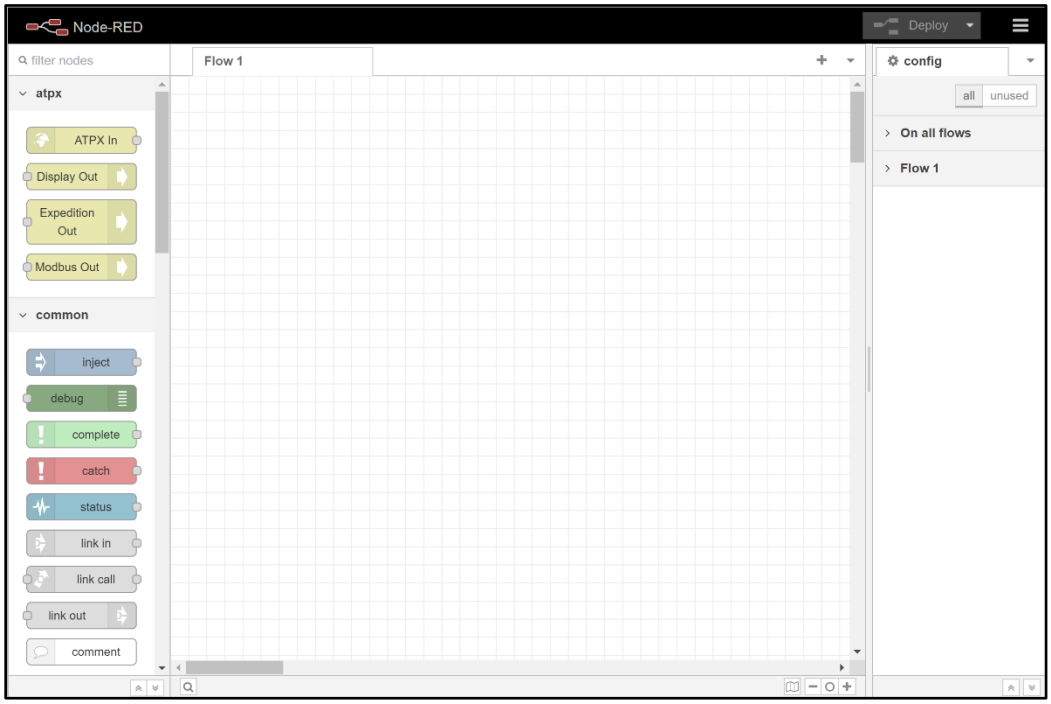


Figure 2: The Node-RED Editor

The ATPX is based around a central data store. Sensor data is pushed in as it arrives and data from the relevant sensors is extracted for calculation.
Node-RED also has access to this data store, through various custom nodes, so that users can extract data from the ATPX or from connected sensors to use in their own calculations.

The results of user calculations can be pushed back to the data store in specific locations to be automatically sent to displays, exported to Expedition, or stored in the ATPX Modbus registers.

To read a value from the ATPX drag the **ATPX In** node on to the editor canvas and double click it.

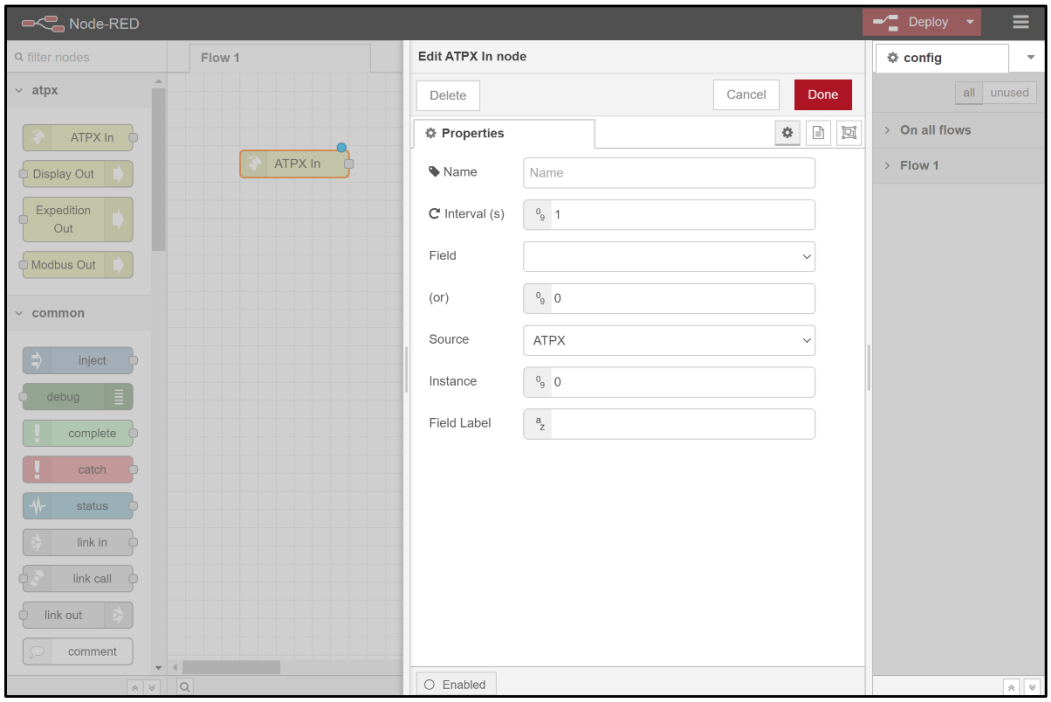


Figure 3: The ATPX-In Node Properties

These node properties must be set:

- **Name** – Label for display only.
- **Interval** – Frequency at which the flow runs in seconds. Default 1s.
- **Field** – Identifies the data to be loaded from the ATP data store. Either select the field from the dropdown menu OR enter the Field ID found on the ATPX **Menu > Settings > Diagnostics > All** page

Field Id	Description	Sender	Instance	Value	String	System Time
0x0202	Boat Speed (kts)	Fastnet	Node 1	0	0.00 kt	11:50:35.166
0x0401	Depth Metres	Fastnet	Node 1	2.72646E+08	272646152.00m	11:50:34.767
0x0520	Rate Of Turn °/s	Main Interface Board	Internal	0.0216662	0.0217	11:50:35.192
0x0710	Heel Angle °	Main Interface Board	Internal	1.0543	1.1°	11:50:35.192
		ATProcessor	Internal	1.05086	1.1°	11:50:35.167
0x0720	Barometer (mbar)	Main Interface Board	Internal	0.98321	983.2 mb	11:50:35.148
0x0722	Trim Angle	Main Interface Board	Internal	-0.635303	-0.6°	11:50:35.192
		ATProcessor	Internal	-0.645605	-0.6°	11:50:35.167
0x0730	CPU Temperature °C	ATProcessor	Internal	56.75	56.8°C	11:50:34.664
0x0731	Enclosure Temp °C	Main Interface Board	Internal	41.6	41.6°C	11:50:35.148

- **Source** – Identifies where the data should come from. This corresponds to the Sender column in the data store. Defaults to ATPX for processor data.
- **Instance –** Corresponds to the Instance column in the data store. Defaults to 0 for internal processor data.

Simple Example:

The following flow reads **Trim** from the ATPX, adds a constant offset and then scales. The result is written back to the ATPX to:

1. Display on Fastnet, CANbus (N2k compatible) or A+T ethernet displays.
2. View and log in Expedition.
3. Write to the ATPX Modbus registers for clients to request over TCP/IP.

First set up the ATPX In node. Here the node has been renamed 'Trim In' and the frequency of calculation set at 2Hz. Note that this is loading the data directly from the sensor on the Main Interface board rather than the processor source of trim (which may come from an external NMEA0183 sensor for example).

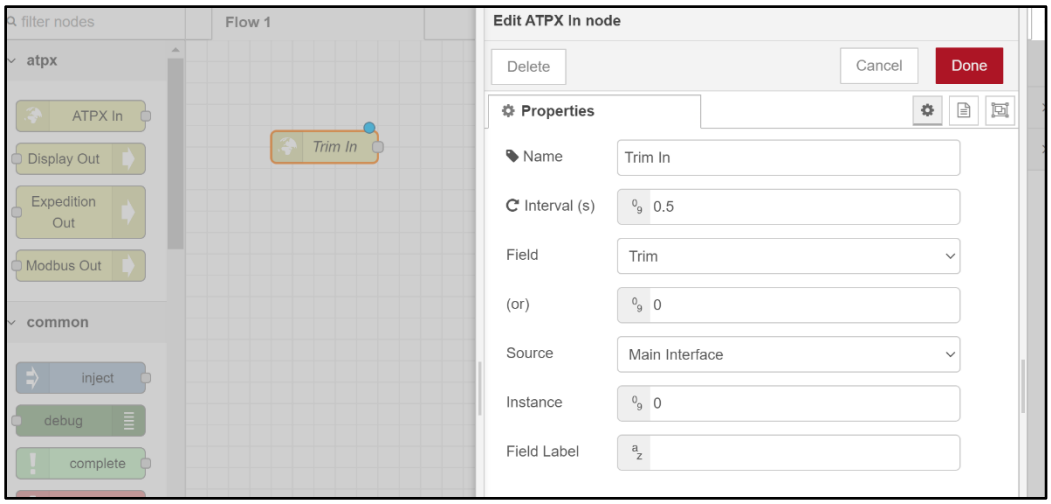


Figure 4: ATPX-In Node configured for Trim.

Click *Done* then drag a function node onto the canvas and connect it to the Trim In node. The function node is extremely useful as you can write JavaScript code to perform arbitrary functions on the retrieved data.
Double click on the function node.

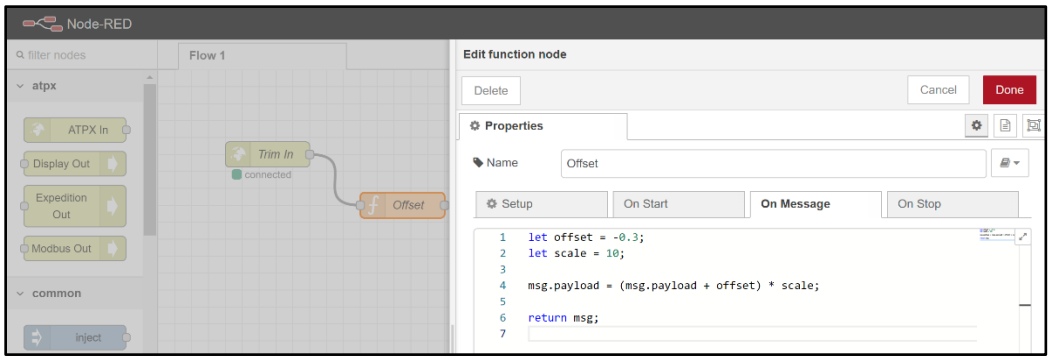


Figure 5: A Node-RED function node.

The result of your calculation should be stored in the *msg.payload* property to allow it to be passed on to other nodes. See the Node-RED documentation for details.

You may choose multiple output destinations by dragging the options onto the canvas and connecting to the function output side. These output nodes are described below.

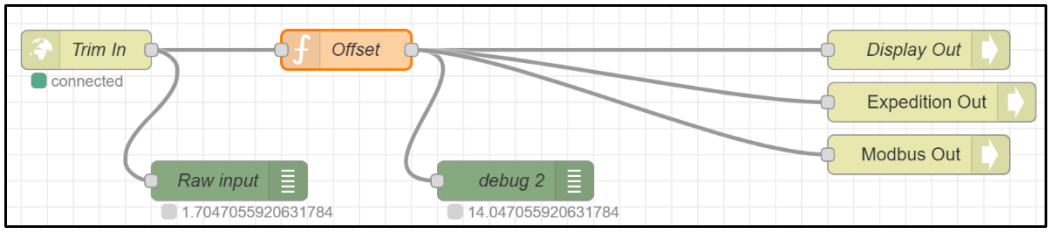


Figure 6: A simple Node-RED flow.

The *Debug* nodes above are used to view live data on the canvas.
Double click on the debug node to edit properties.

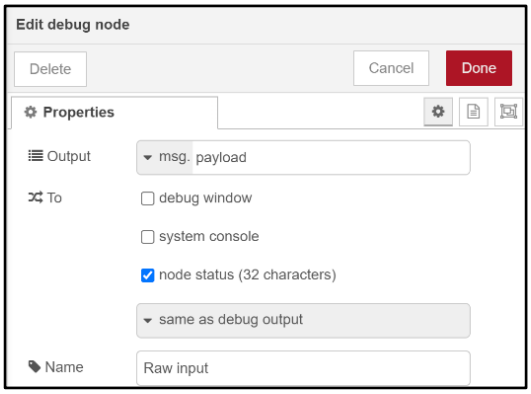


Figure 7: The Node-RED Debug node.

The **Display Out** node writes data back to the ATPX ready to be sent to displays.

ATPX display channels are numbered from 0 to 255. Selecting a channel number that is already assigned will result in data displayed from both data sources.

See **Appendix C** for a display channel list and select an unused channel for custom data.

The Label field will be shown with the data on the display.

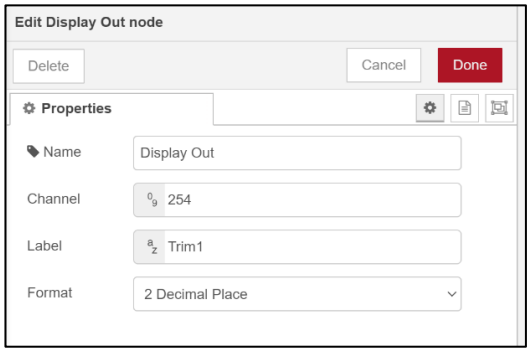


Figure 8: The Display Out node.

The **Expedition Out** node writes data back to the ATPX to be exported to Expedition. This requires that an Expedition connection is configured on the ATPX **Menu > I/O > UDP/TCP** page.

Figure 9: The Expedition Out node.

Data will be sent to the Expedition **User Channel** defined. User channels in Expedition are numbered 0-31.

You must set the RX filter within the Expedition application, found at:
Instruments > Network connection port > A+T Settings > Exp Rx filter.
User channels can also be renamed within Expedition.

If, on the ATPX **Menu > I/O > Expedition > Export** page, the Expedition user channel already has ATPX data selected and enabled then this data will be prioritised over Node-RED data. Uncheck enable for Node-RED data to be sent to Expedition.

The **Modbus Out** node writes data back to the ATPX to be accessed by MODBUS clients.

Enter the ATPX Modbus register to write data to.

See **Appendix B** for the default ATPX Modbus register. Select an unused channel for custom data.

You may view the Node-RED Modbus register data on the ATPX **Menu > Settings > Diagnostics > Modbus** page.

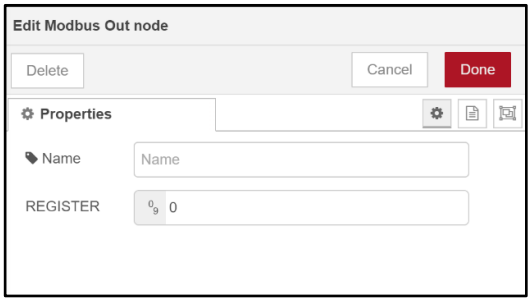


Figure 10: The Modbus Out node.

Finally click 

to save any changes and activate the Flow.

To save and back up flows you may export and download in JSON file format.

Conversely you may import backups or new flows to Node-RED using the import function.

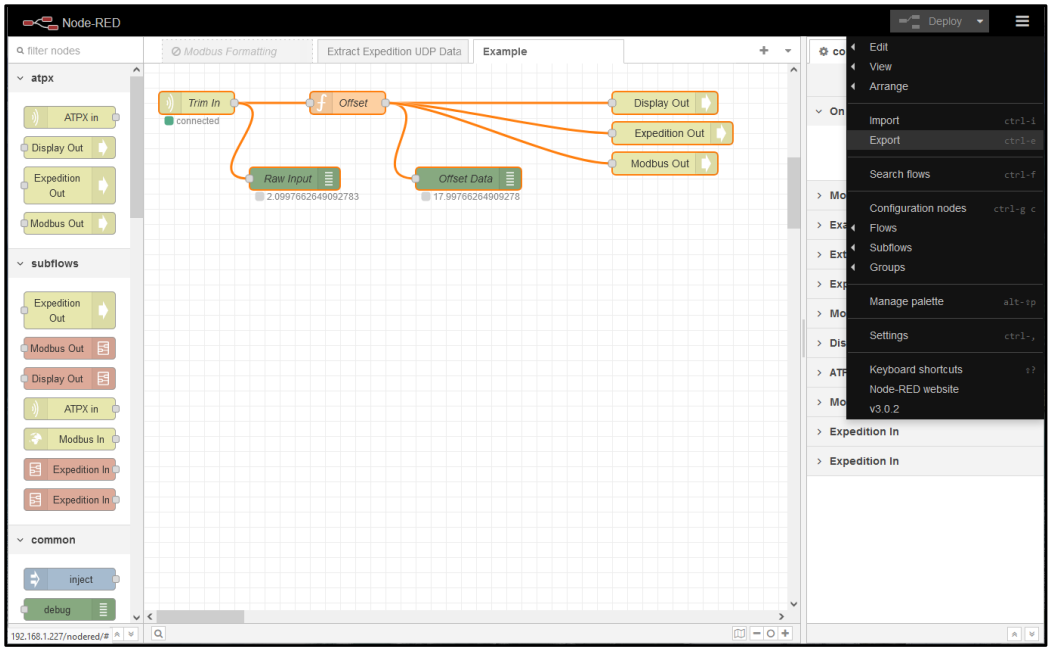


Figure 11: Node-RED Import and Export options

Contact A+T for a quote to build, test and supply specific or advanced flows such as the use of lookup tables or advanced mathematical operations and filtering options.

5. Modbus

The MODBUS over TCP/IP protocol provides server/client connection to external devices such as PLCs.

Official specifications can be found at https://modbus.org/ and your Modbus interfaced equipment instructions.

The ATPX operates as both a client and server, depending on communication direction. Data can be requested from the ATPX (as a server) much like a PLC. In this way the ATPX should be familiar to PLC engineers.
A list of the default registers can be found in **Appendix B**. Additionally user defined data can be inserted into registers 0 – 4095 via Node-RED as described in section 4.

To import data from another Modbus device, either for direct display or further calculation through Node-RED, the ATPX operates as a client.
Configuration is through the webserver on the **Menu > I/O > Modbus** page**:**

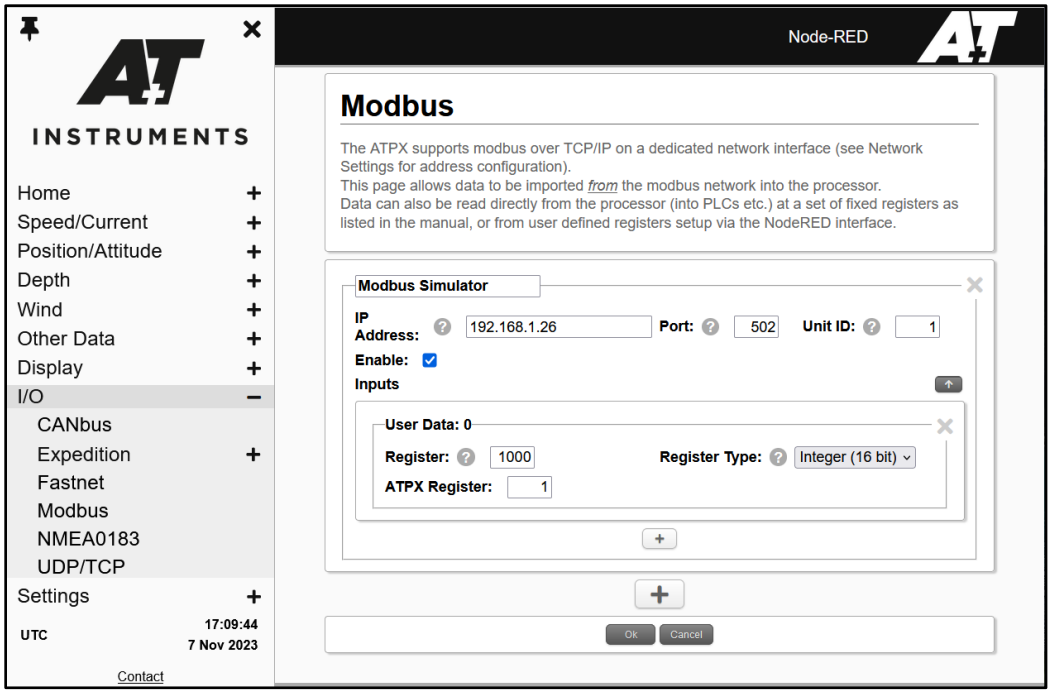


Figure 12: The Modbus Configuration Page

Add new connections by clicking '**+**' at the bottom of the page and add new registers to an existing connection by clicking '**+**' on the specific connection.

Configuration should be carried out as follows:

1. Enter the *IP Address* of the MODBUS server.
2. *Port* 502 is standard for the MODBUS protocol. You should **not** need to edit this unless you have a non-conforming device.
3. The *Unit ID* is often not required for MODBUS over TCP/IP. However some devices expect 0xFF (this should be specified in the device manual). It may also be required if communicating to a MODBUS serial device through a gateway.
4. Check the *Enable* box.
5. Enter the *Register* number in the MODBUS server. This is the register of the datum you intend to import.
6. Set the *Register Type* to match the datum in the MODBUS server.
7. Enter an *ATPX Register* number to store the imported datum. This is the number that will be displayed on the **Menu > Settings > Diagnostics** pages and used to manipulate the datum in Node-RED. Note that this register **can** collide with existing registers, so avoid register numbers in the predefined list from **Appendix B.**

This process only loads data into the ATPX registers. To display this data or use it for further calculation you must import to Node-RED using the **Modbus In** node.

Appendix A – ATPX Field Listing

The export column indicates whether the field is available in the default user select boxes.

Field Description	Export	Field ID
GNSS Latitude	False	256
GNSS Longitude	False	257
GNSS HDOP	False	258
GNSS SOG (kts)	True	259
GNSS COG_T	True	260
GNSS COG_M	True	261
GNSS Fix Time	True	262
GNSS SOG (kmph)	False	265
GNSS Latitude (NMEA0183)	False	272
GNSS Longitude (NMEA0183)	False	273
GNSS North/South	False	274
GNSS East/West	False	275
GNSS XTE	False	288
GNSS VMG	False	289
Distance To Waypoint (nm)	False	290
Bearing To Waypoint T(RL)	False	291
Bearing To Waypoint M(RL)	False	292
GNSS Days Since Epoch	False	293
GNSS Local Time Offset	False	294
Time To Waypoint	False	295
Waypoint From	False	296
Waypoint To	False	297
Distance To Waypoint (GC)	False	298
Bearing To Waypoint T(GC)	False	299
Bearing To Waypoint M(GC)	False	300
Waypoint Latitude	False	301
Waypoint Longitude	False	302
Origin To Waypoint T(GC)	False	303
Origin To Waypoint M(GC)	False	304
Origin To Waypoint T(RL)	False	305
Origin To Waypoint M(RL)	False	306
Waypoint ETA Date	False	307

GNSS Altitude	False	322
GNSS System Type	False	323
GNSS Method	False	324
GNSS Integrity	False	325
Number of Satellites	False	326
Dilution of Precision	False	327
Geoidal Separation	False	328
Num Reference Stations	False	329
Ref Station Type	False	330
Ref Station Id	False	331
Log Pulse Time (m/s)	False	512
Log Pulse Count	False	513
Boat Speed (kts)	False	514
Boat Speed (m/s)	False	515
Log Pulse Freq	False	516
Boat Speed (kmph)	False	517
Temperature Speed Log (°C)	False	528

Speed Temp ADC Value	False	529
Speed Temp Ref Value	False	530
Wind Pulse Time (m/s)	False	768
Wind Pulse Count	False	769
MAWS (kts)	True	770
Raw MAWA (°)	True	771
MAWS (m/s)	False	772
Wind Pulse Freq (Hz)	False	773
Raw MAWS (kts)	True	774
MAWA (°)	True	775
Motion Corrected MAWS	False	786
Motion Corrected MAWA	False	791
Wind Velocity U	False	792
Wind Velocity V	False	793
Mast Velocity U	False	794
Mast Velocity V	False	795
Total Mast Motion U	False	796
Total Mast Motion V	False	797
Wind Red Phase (V)	False	800
Wind Green Phase (V)	False	801

Wind Blue Phase (V)	False	802
Wind MHU Voltage	False	803
Red Phase ADC	False	816
Green Phase ADC	False	817
Blue Phase ADC	False	818
MHU Supply ADC	False	819
MHU ADC Error	False	822
Depth Metres	True	1025
Depth feet	False	1026
Depth fathoms	False	1027
Transducer Datum (m)	True	1028
Depth Signal (0-255)	False	1040
Depth Noise (0-255)	False	1041
Depth Reliability (0-8)	False	1042
Heading °T	False	1280
Heading °M	False	1281
Magnetic Variation °	False	1282
Heading Deviation °	False	1283
Rate Of Turn °/s	True	1312
NMEA 0183 AWS (kmph)	False	1539
NMEA 0183 AWS (mph)	False	1540
NMEA 0183 TWS (kmph)	False	1555
NMEA 0183 TWS (mph)	False	1556
Air Temp °C	False	1792
Air Temp °F	False	1793
Sea Temp °C	False	1794
Sea Temp °F	False	1795
Heel Angle °	True	1808
Rudder Angle °	True	1809
Port Rudder Angle °	False	1810

Barometer (mbar)	False	1824
Mast Rotation	True	1825
Trim Angle	True	1826
CPU Temperature °C	False	1840
Enclosure Temp °C	False	1841
Raw Accelerometer X	False	1856
Raw Accelerometer Y	False	1857

Raw Accelerometer Z	False	1858
Raw Heel Angle	False	1860
Raw Trim Angle	False	1861
BMI160 Raw Temp	False	1862
Raw Yaw Angle	False	1863
Calc Accelerometer X	False	1872
Calc Accelerometer Y	False	1873
Calc Accelerometer Z	False	1874
Calc Total Gravity	False	1875
BMI160 Temperature	False	1876
Raw Gyro X	False	1888
Raw Gyro Y	False	1889
Raw Gyro Z	False	1890
Calc Gyro X	False	1891
Calc Gyro Y	False	1892
Calc Gyro Z	False	1893
Heel Angle Gyro Rate	True	1894
Pitch Angle Gyro Rate	True	1895
Yaw Angle Gyro Rate	True	1896
Accelerometer Velocity X	False	1904
Accelerometer Velocity Y	False	1905
Accelerometer Velocity Z	False	1906
Raw Analogue Val 1	False	2049
Raw Analogue Val 2	False	2050
Raw Analogue Val 3	False	2051
Raw Analogue Val 4	False	2052
Raw Analogue Val 5	False	2053
Raw Analogue Val 6	False	2054
Raw Analogue Val 7	False	2055
Raw Analogue Ref 1	False	2065
Analogue Sequence	False	2072
Analogue Timer	False	2073
Raw Loadcell Value	False	2431
Fastnet Resistance	False	2451
Calculated Latitude	True	4352
Calculated Longitude	True	4353
MOB Status	True	4367

MOB Start Latitude	True	4368
MOB Start Longitude	True	4369
DR Range to MOB (m) from Ship	True	4372
DR Bearing to MOB from Ship (°T)	True	4373
DR Bearing to MOB from Ship (°M)	True	4374
MOB Time in Water (s)	True	4375

GNSS Range to MOB (m) from Ship	True	4376
GNSS Bearing to MOB from Ship (°T)	True	4377
GNSS Bearing to MOB from Ship (°M)	True	4378
MOB Calculation Mode	True	4379
MOB ID	True	4380
MOB Activation Time	True	4381
MOB SOG	True	4382
MOB COG °T	True	4383
Anchor Watch Latitude	True	4384
Anchor Watch Longitude	True	4385
Anchor Watch Distance	True	4386
Anchor Watch Bearing	True	4387
Local Date	True	4416
Local Time	True	4417
UT Date	True	4418
UT Time	True	4419
System Date	True	4420
System Time	True	4421
Date from External Source	False	4422
Time from External Source	False	4423
ET->UT Time Delta	False	4424
ET->UT Time Delta Average	False	4425
Local Time Offset	True	4426
ST->UT Time Delta	True	4432
Race Timer	False	4448
Boat Speed (kts)	True	4610
Boat Speed (m/s)	True	4611
Corrected Calibration Value	True	4612
Boat Speed before Calibration (kts)	True	4613
Current Speed Source	True	4614
Dead-Reckoned Distance	True	4615

Dead-Reckoned Latitude	True	4616
Dead-Reckoned Longitude	True	4617
Trip Log (m)	True	4624
Stored Log (m)	True	4625
Trip Log (nm)	True	4626
Stored Log (nm)	True	4627
Current Direction °T	True	4656
Current Direction °M	True	4657
Current Rate (kts)	True	4658
Current Rate (m/s)	True	4659
Distance between DR and GNSS	True	4661
Current Calc Error Code	False	4672
App Wind Speed (kts)	True	4864
App Wind Speed (m/s)	True	4865
App Wind Angle	True	4866
VMG (kts)	True	4885
Current Wind Source	True	4887
True Wind Speed (kts)	True	4896
Calc Water TWS (m/s)	True	4897

True Wind Angle	True	4898
True Wind Dir °M	True	4900
True Wind Dir °T	True	4901
Calc Ground TWS (kts)	False	4912
Calc Ground TWS (m/s)	False	4913
Calc Ground TWA (°)	False	4914
Calc Ground TWA Course (°)	False	4915
Calc Ground TWD (°M)	False	4916
Calc Ground TWD (°T)	False	4917
Original TWA °	True	4928
Original TWS (kts)	True	4929
TWS Correction (%)	True	4930
TWA Correction	True	4931
AWS Correction (%)	True	4932
AWA Correction	True	4933
Point Of Sail	True	4934
Heading TWA before Leeway	True	4935
Leeway	True	4936

Sailing Tack	True	4937
Inter Calc AWS (kts)	True	4944
Inter Calc AWS (m/s)	False	4945
Inter Calc AWA °	True	4946
Heel Speed Correction	False	4947
Heel Angle Correction	False	4948
Signed Leeway	True	4949
Mast Motion AWA Correction	False	4950
Mast Motion AWS Correction	False	4951
Mast Motion AWA Pre Correction	False	4952
Mast Motion AWS Pre Correction	False	4953
Opposite Tack	True	4982
Depth with Datum (m)	True	5121
Depth with Datum (ft)	True	5122
Depth with Datum (fathom)	True	5123
Current Depth Source	True	5124
Alarm Status	True	5152
Fastnet System Alarm	False	5375
Heading °T	True	5376
Heading °M	True	5377
System Variation	True	5378
Course °T	True	5408
Course °M	True	5409
Air Temp °C	True	5888
Air Temp °F	True	5889
Water Temp °C	True	5890
Water Temp °F	True	5891
Barometer (mbar)	True	5920
Analogue Val Ch 1	False	6145
Analogue Val Ch 2	False	6146
Analogue Val Ch 3	False	6147
Analogue Val Ch 4	False	6148
Analogue Val Ch 5	False	6149
Analogue Val Ch 6	False	6150
Analogue Val Ch 7	False	6151
Analogue Voltage Ch 1	False	6193
Analogue Voltage Ch 2	False	6194

Analogue Voltage Ch 3	False	6195
Analogue Voltage Ch 4	False	6196
0-20ma Current	False	6197
ATP Supply Voltage	False	6198
ATP Supply Current	False	6199
GNSS Source 1 Latitude	True	8209
GNSS Source 1 Longitude	True	8210
GPS Source 1 Fix Time	True	8214
GNSS Source 2 Latitude	True	8225
GNSS Source 2 Longitude	True	8226
GPS Source 2 Fix Time	True	8230
GNSS Source 3 Latitude	True	8241
GNSS Source 3 Longitude	True	8242
GPS Source 3 Fix Time	True	8246
GNSS Source 4 Latitude	True	8257
GNSS Source 4 Longitude	True	8258
GPS Source 4 Fix Time	True	8262
Depth Source 1	True	9233
Depth Source 1 Datum	True	9234
Depth Source 1 Raw	True	9235
Depth Source 2	True	9249
Depth Source 2 Datum	True	9250
Depth Source 2 Raw	True	9251
Depth Source 3	True	9265
Depth Source 3 Datum	True	9266
Depth Source 3 Raw	True	9267
Depth Source 4	True	9281
Depth Source 4 Datum	True	9282
Depth Source 4 Raw	True	9283
Heading Source 1 (T)	True	9489
Heading Source 1 (M)	True	9490
Heading Source 2 (T)	True	9505
Heading Source 2 (M)	True	9506
Heading Source 3 (T)	True	9521
Heading Source 3 (M)	True	9522
Heading Source 4 (T)	True	9537
Heading Source 4 (M)	True	9538

Speed Source 1	True	9745
Base Speed SS 1	True	9747
Heel Correction SS 1	True	9748
Speed Source 2	True	9761
Base Speed SS 2	True	9763
Heel Correction SS 2	True	9764
Speed Source 3	True	9777
Base Speed SS 3	True	9779

Heel Correction SS 3	True	9780
Speed Source 4	True	9793
Base Speed SS 4	True	9795
Heel Correction SS 4	True	9796
Wind Source 1 (AWA)	True	10001
Wind Source 1 (AWS)	True	10002
Wind Source 1 (TWA)	True	10003
Wind Source 1 (TWS)	True	10004
Wind Source 2 (AWA)	True	10017
Wind Source 2 (AWS)	True	10018
Wind Source 2 (TWA)	True	10019
Wind Source 2 (TWS)	True	10020
Wind Source 3 (AWA)	True	10033
Wind Source 3 (AWS)	True	10034
Wind Source 3 (TWA)	True	10035
Wind Source 3 (TWS)	True	10036
Wind Source 4 (AWA)	True	10049
Wind Source 4 (AWS)	True	10050
Wind Source 4 (TWA)	True	10051
Wind Source 4 (TWS)	True	10052
ATP Messages Received	False	20736
ATP Messages Sent	False	20737
Interface 1 Received	False	20738
Interface 1 Sent	False	20739
Interface 2 Received	False	20740
Interface 2 Sent	False	20741
Interface 3 Received	False	20742
Interface 3 Sent	False	20743
Interface 4 Received	False	20744

Interface 4 Sent	False	20745
Interface 5 Received	False	20752
Interface 5 Sent	False	20753
Interface 6 Received	False	20754
Interface 6 Sent	False	20755
Interface 7 Received	False	20756
Interface 7 Sent	False	20757
Interface 8 Received	False	20758
Interface 8 Sent	False	20759

Appendix B – ATPX Modbus Registers

Modbus TCP Register List				
Description	**Address**	**Type**	**Scale factor**	**Remarks**
MOB Status	1	uint16	1	Active = 1, Inactive = 0
GPS Latitude	100	float	n/a	Decimal degrees
GPS Longitude	102	float	n/a	Decimal degrees
GPS SOG	104	uint16	100	
GPS COG (°T)	105	uint16	10	
GPS COG (°M)	106	uint16	10	
Boat Speed (kts)	200	uint16	100	Calculated boat speed before system damping
Trip Log (nm)	212	uint32	100	
Stored Log (nm)	214	uint32	100	
Current Direction °T	230	uint16	10	
Current Direction °M	231	uint16	10	
Current Speed (kts)	232	uint16	10	
Apparent Wind Speed (kts)	300	int16	10	AWS after corrections
Apparent Wind Angle	301	int16	10	AWA after corrections
True Wind Speed (kts)	320	int16	10	TWS after corrections
True Wind Angle	321	int16	10	TWA after corrections
True Wind Direction (°T)	324	uint16	10	
True Wind Direction (°M)	325	uint16	10	
Leeway	348	int16	10	
Tack	349	int16	1	Port = 1, Stbd = 2
Depth (m)	400	int16	10	
Heading (°T)	500	uint16	10	
Heading (°M)	501	uint16	10	
Course (°T)	520	uint16	10	
Course (°M)	521	uint16	10	

Air Temperature (°C)	700	int16	100	
Sea Temperature (°C)	702	int16	100	
Rudder Angle	711	int16	10	
Barometric Pressure	720	uint16	10	
Heel Angle	744	int16	10	
Trim Angle	745	int16	10	
Main Interface Board Analogue Input 1	801	int16	10	
Main Interface Board Analogue Input 2	802	int16	10	
Main Interface Board Analogue Input 3	803	int16	10	
Main Interface Board Analogue Input 4	804	int16	10	
Analogue Board 1 Input 1	811	int16	10	
Analogue Board 1 Input 2	812	int16	10	
Analogue Board 1 Input 3	813	int16	10	
Analogue Board 1 Input 4	814	int16	10	
Analogue Board 1 Input 5	815	int16	10	
Analogue Board 2 Input 1	821	int16	10	
Analogue Board 2 Input 2	822	int16	10	
Analogue Board 2 Input 3	823	int16	10	
Analogue Board 2 Input 4	824	int16	10	
Analogue Board 2 Input 5	825	int16	10	
The registers below are special registers for use on systems with redundant backups or nonstandard configurations				
Generally, the default data source should be preferred (i.e. use Heading (°T) rather than Heading Source 1 (°T))				
Position Source 1 Latitude	2010	float	n/a	
Position Source 1 Longitude	2014	float	n/a	
Position Source 2 Latitude	2020	float	n/a	
Position Source 2 Longitude	2024	float	n/a	
Depth Source 1 (m)	2401	int16	10	Depth with datum offset applied
Depth Source 2 (m)	2402	int16	10	Depth with datum offset applied
Depth Source 3 (m)	2403	int16	10	Depth with datum offset applied
Depth Source 4 (m)	2404	int16	10	Depth with datum offset applied

Heading Source 1 (°T)	2511	uint16	10	Heading data with fixed offset only
Heading Source 1 (°M)	2512	uint16	10	Heading data with fixed offset only
Heading Source 2 (°T)	2521	uint16	10	Heading data with fixed offset only
Heading Source 2 (°M)	2522	uint16	10	Heading data with fixed offset only
Speed Source 1 (kts)	2611	uint16	100	Source boat speed with heel correction applied
Speed Source 2 (kts)	2621	uint16	100	Source boat speed with heel correction applied
Wind Source 1 AWS (kts)	2711	int16	10	
Wind Source 1 AWA	2712	int16	10	
Wind Source 1 TWS (kts)	2713	int16	10	
Wind Source 1 TWA	2714	int16	10	
Wind Source 2 AWS (kts)	2721	int16	10	
Wind Source 2 AWA	2722	int16	10	
Wind Source 2 TWS (kts)	2723	int16	10	
Wind Source 2 TWA	2724	int16	10	

Appendix C – Fastnet Channel Listing

Channels in bold are sent by the ATP by default. Note that additional channels, particularly *Linear* and *Remote* channels may also be send depending on the ATPX webserver configuration.

Channel Description	Channel #
LOADCELL 1	3
LOADCELL 2	4
LOADCELL 3	5
LOADCELL 4	6
LOADCELL 5	7
LOADCELL 6	8
LOADCELL 7	9
LOADCELL 8	10
RUDDER ANGLE	**11**
LINEAR 5	16
LINEAR 6	17
LINEAR 7	18
LINEAR 8	19
LINEAR 9	20
LINEAR 10	21
LINEAR 11	22
LINEAR 12	23
LINEAR 13	24
LINEAR 14	25
LINEAR 15	26
LINEAR 16	27
AIR TEMPERATURE DEGREES F	**28**
AIR TEMPERATURE DEGREES C	**29**
SEA TEMP DEGREES F	**30**
SEA TEMP DEGREES C	**31**
HEAD LIFT TREND	39
OFF COURSE PILOT	41

COG MAG	**234**
SOG	**235**
VMG TO WAYPOINT	236
TIME TO WAYPOINT	237
XTE	238
REMOTE 0	239
REMOTE 1	240
REMOTE 2	241

REMOTE 3	242
REMOTE 4	243
REMOTE 5	244
REMOTE 6	245
REMOTE 7	246
REMOTE 8	247
REMOTE 9	248
NEXT WAYPOINT DISTANCE	250
TIME TO LAYLINE	252
IP ADDRESS	**254**