System Interfaces

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Openplotter NMEA I/F Editar

Openplotter integrates GPS and plotter capabilities to provide user with all required means to define a route and send it to Autopilot. Openplotter is required for Nav mode.

Autopilot and Openplotter implements an I/F in both directions

Data sent by Openplotter to Autopilot in ALL working modes from different sources: Editar

- **Windvane and calculations**
  - apparent wind angle (AWA)
  - apparent wind speed (AWS)
  - true wind speed (TWS)
  - true wind angle (TWA)
- **External Compass (only in External Compass mode):**
  - Magnetic heading (HDM)
  - heel angle (HEL, HRM) Heeling Angle in degrees of the port/starboard inclination of the boat.
- **GPS Fix**
  - speed over ground (SOG/SPD)
  - course over ground (COG/TRK)
- **Speed Log**
  - boat speed trough water (STW)

Data sent by Openplotter to Autopilot in NAV Mode: Editar

- **Route**
  - Cross Track Error (XTE) - Minimum distance to route.
  - Distance To Next Waypoint (DTW)
  - Origin Waypoint (WPT XXXX)
  - Next Waypoint ID (APB-WPT)
  - Next Waypoint (WPT XXXX)
- **Angles**
  - Bearing Origin to Next Waypoint (BOD) - M or T
  - Bearing, present position To Next Waypoint (BTW/BRG)
  - Turn (TRN) - Difference between TRK and BRG
  - Course To Steer to Next Waypoint (CTS) - An average value between BRG and XTE angle.
- **Time**
  - Estimated Time En-route (ETE) How much time it takes to arrive?
  - Estimated Time to Arrival (ETA) ¿At what time are we going to arrive?
- **Speed**
  - Velocity made good (VMG) - Diference in distance to the WP. May be negative

Message: $RMC- Editar

$GPRMC,083551.353,V,3554.931,N,07402.499,W,75.9,3.41,071218,,E*45

$GPRMC,083552.353,V,3554.932,N,07402.500,W,63.7,3.37,071218,,E*4C

$GPRMC,083553.353,V,3554.933,N,07402.502,W,26.9,3.45,071218,,E*44

Message: $APB - Autopilot Sentence "B" Editar

Field	Value	Function
1	V	Loran-C Blink or SNR warning. General warning flag or other navigation systems when a reliable fix is not available

1	A	A = OK or not used
2	V	Loran-C Cycle Lock warning flag
2	A	OK or not used
3	Float	Cross Track Error (XTE) Magnitude - Minimum distance to route
4	L	Direction to Steer - Portboard
4	R	Direction to Steer - Starboard
5	N	Cross Track Error (XTE) Units: Nautical miles
5	K	Cross Track Error (XTE) Units: Kilometers
6	V	Arrival Circle Alarm: No alarm
6	A	Arrival Circle Alarm: Arrival Circle Entered
7	V	Perpendicular Arrival Alarm: No alarm
7	A	Perpendicular Arrival Alarm: Perpendicular passed at waypoint
8	Float	Bearing Origin to Next Waypoint (BOD) - Angle magnitude
9	M	Bearing Origin to Next Waypoint (BOD) - Magnetic angle
9	T	Bearing Origin to Next Waypoint (BOD) - True angle
10	C--C	Destination Waypoint ID
11	Float	Bearing, present position To Next Waypoint (BTW/BRG) - Angle magnitude
12	M	Bearing, present position To Next Waypoint (BTW/BRG) - Magnetic angle
12	T	Bearing, present position To Next Waypoint (BTW/BRG) - True angle
13	Float	Course To Steer to Next Waypoint (CTS) - Angle magnitude
14	M	Course To Steer to Next Waypoint (CTS) - Magnetic angle
14	T	Course To Steer to Next Waypoint (CTS) - True angle

Example:

$GPAPB,A,A,0.10,R,N,V,V,011,M,DEST,011,M,011,M*3C

$GPAPB,A,A,0.10,R,N,V,V,012,M,DEST,11.50,M,9.03,M*00

$GPAPB,A,A,0.1,R,K,V,V,0.12,M,DEST,11.50,M,9.03,M*1B

Data sent from Autopilot to Openplotter in ALL working modes: Editar

- **Internal compass (in Internal Compass Mode only):**

Message: $HDG - Heading - Deviation & Variation

Field	Value	Function
1	Float x.x	Magnetic Sensor heading in degrees
2	Float x.x	Magnetic Deviation, degrees
3	E	Magnetic Deviation direction, E = Easterly
3	W	Magnetic Deviation direction, W = Westerly
4	Float x.x	Magnetic Variation degrees
5	E	Magnetic Variation direction, E = Easterly
5	W	Magnetic Variation direction, W = Westerly

Message: $HDM - Heading Magnetic

Field	Value	Function
1	Float x.x	Heading Degrees, magnetic
2	M	M=Magnetic

Message: $HDT - Heading True

Field	Value	Function
1	Float x.x	Heading Degrees, true
2	T	T=True

- Heel angle (HEL, HRM) Heeling Angle in degrees of the port/starboard inclination of the boat.
- **Rudder position**

Message: $RSA - Rudder Sensor Angle

Field	Value	Function
1	Float x.x	Starboard (or single) rudder sensor, "-" means Turn To Port
2	A	Status, A means data is valid
3	Float x.x	Port rudder sensor
4	A	Status, A means data is valid

Serial HMI I/F Editar

Message: $PEMC Editar

Field	Value	Function	Additional Field	Sentence
1	00	Switch working mode from STAND BY to AUTO	N/A	$PEMC,00*37
1	01	Change Current Rudder	2: Change rate	$PEMC,01,r*68
1	02	Change CTS (Current Target Steering)	2: Change rate	$PEMC,02,i*70
1	03	Get Installation Parameters	2: Installation Parameters	$PEMC,03,2,45,5,S,2,-3.2,-32.9,10*xx
1	04	Set Installation Parameters	2: Installation Parameters	$PEMC,04,2,40,4,S,3,4.1,33.9,9*xx
1	05	Get PID gain (incl. sample time and deadband)	2: PID Gain	$PEMC,05,2,0.01,0.5,1000,A*xx
1	06	Set PID gain (inc. sample time and deadband)	2: PID Gain	$PEMC,06,3,0.11,0.7,1000,m*xx
1	07	Get Autopilot information	2: APinfo	$PEMC,07,S,12,35.60,30.02,2,-0.50*65
1	08	Request information	2: 'I' Request Installation Parameters (message $PEMC,03) 2: 'G' Request Gain (message $PEMC,05) 2: 'A' Request Autopilot info. (message $PEMC,07)	$PEMC,08,I*5A $PEMC,08,G*54 $PEMC,08,A*52
1	09	Enter/ Exit into IMU Calibration mode	N/A	$PEMC,09*3E
1	10	Enter/ Exit Feedback Calibration mode	N/A	$PEMC,10*36
1	11	Save values	2: 'I' Save Installation and current Feedback Parameters 2: 'G' Save current PID Gain parameters 3: 'C' Save current IMU Offsets 4: 'R' Restore Inst.Param, Feedback and PID Gain to hardcoded values	$PEMC,11,I*52 $PEMC,11,G*5C $PEMC,11,C*58 $PEMC,11,R*49

Additional Field: Change rate Editar

Field	Value	Function	Additional Field
n	'i'	Increment Current by 1 Position Unit	N/A
n	'I'	Increment Current by 10 Position Unit	N/A
n	'r'	Reduce Current by 1 Position Unit	N/A
n	'R'	Reduce Current by 10 Position Uni	N/A

Additional Field: Installation Parameters Editar

Field	Value	Function	Additional Field
n	Integer	Centered Tiller Position	N/A
n+1	Positive Int	Maximum rudder angle	N/A
n+2	Positive Int	Average Cruise Speed	N/A
n+3	'S'	Installation Side: Starboard	N/A
n+3	'P'	Installation Side: Portboard	N/A

n+4	Positive Int	Rudder Damping	N/A
n+5	Float	Magnetic Variation	N/A
n+6	Float	Heading Alignment	N/A
n+7	Positive Int	Off course alarm angle	N/A

Additional Field: PID Gain Editar

Field	Value	Function	Additional Field
n	Float	Kp	N/A
n+1	Float	Ki	N/A
n+2	Float	Kd	N/A
n+3	unsigned long	Sample Time (mSec)	N/A
n+4	'm'	Deadband: Min	N/A
n+4	'M'	Deadband: Max	N/A
n+4	'A'	Deadband: Auto	N/A

Additional Field: APinfo Editar

Field	Value	Function	Additional Field
n	'S'	STAND-BY Mode	N/A
n	'A'	AUTO Mode	N/A
n	'T'	TRACK Mode	N/A
n+1	Integer	Current Rudder	N/A
n+2	Float	Heading Magnetic (HDM) - Magnitude (M)	N/A
n+3	Float	Course To Steer (CTS) - Magnitude (M)	N/A
n+4	Positive int	Deadband value	N/A
n+5	Float	Trimming value	N/A

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