Yacht Devices

User Manual

Engine and Tank Monitoring Firmware

version 1.00e

for

Text Display YDTD-20N

2016

Contents

I. Introduction

Yacht Devices Text Display YDTD-20N is an informational display intended to show data from the boat's NMEA 2000 network. It does not contain any sensors, real time clock or other information sources. It can only display various network data depending on the installed firmware.

You can download firmware from our web site, copy it to the MicroSD card, and change the type of your display in minutes. This document describes the Engine and Tank Monitoring Firmware, which allows you to see the following data:

— detailed engine and transmission data, including oil pressure and temperature, alarms and warnings;
— trim tabs and engine trim data;
— fuel pressure and consumption;
— detailed battery data, including case temperature and current;
— diesel, gasoline, fresh and black water tank data, including level and volume.

This document describes the Firmware only. All other topics, including installation, the Display's menu navigation, troubleshooting, firmware updates or replacement, are covered in the document "User Manual of the Text Display YDTD-20N with Instrument Display Firmware". You may download this document at this link:

http://www.yachtd.com/downloads/ydtd20.pdf

We thank you for purchasing our Devices and wish you happy voyages!

II. Firmware Overview

With this firmware, you can monitor up to four engines and transmissions, temperature in the exhaust system, the vessel's trim tabs, four batteries, four tanks with diesel and four tanks with gasoline, three fresh water and three black water tanks. The Display shows all possible engine and transmission data defined in NMEA 2000 2.100 standard (released at February 2015), except the engine's VIN and the engine's software version. We also included speed data (over ground, SOG, and thru water, STW) for your convenience.

From 1 to 40 pages with data are available in the data view depends on the Display's settings; the user can exclude any page from the data view.

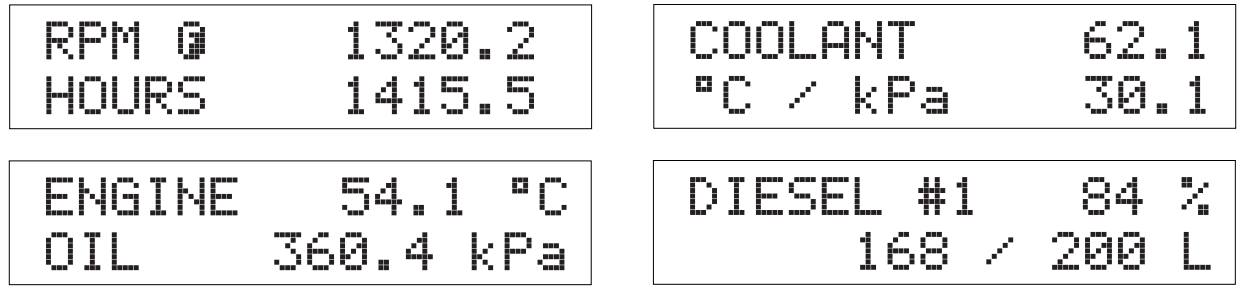

Figure 1. Display screens, layout for a single engine

Depending on the number of engines specified in the Display's settings, different layouts are used for data pages. Figure 1 contains screens with the single engine layout. Engine revolutions, gear ('F' in the circle means "Forward" gear state) and engine hours are shown on one page. This layout contains the smallest number of pages.

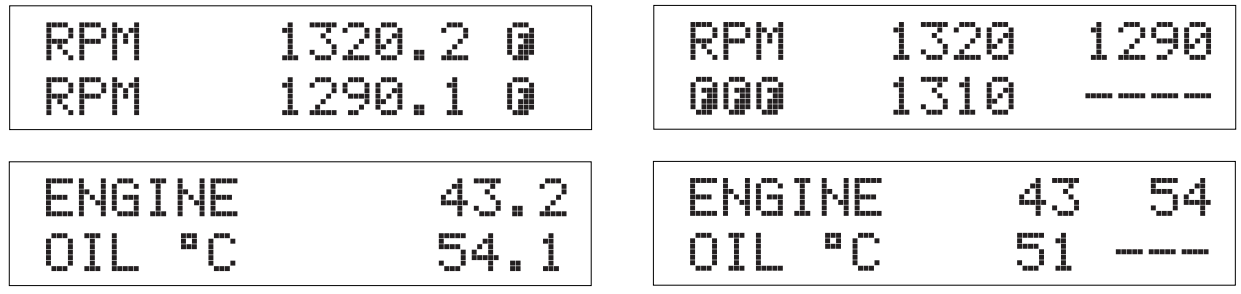

Figure 2. Twin engine layout (left) and four engine layout (right)

In the twin engine layout (see fig.2, left column) only engine revolutions and gear are joined in one page; engine hours are displayed in the next page of data view.

The Display has no separate layout for three engine systems, so the four engine layout should be used in this case; you will see placeholders "----" or "--.-" instead of the data from a fourth engine in this case (see fig.2, right column). If you have a data page with only placeholders, it means that your system does not have the corresponding data and you may hide this page in the Display settings.

In the four engine layout, the decimal part of a number may be rounded and omitted where applicable. For example, a page with engine revolutions does not contain decimal parts (see fig.2, top right).

Figure 3. Abbreviations in four engine layout

Due to screen size limitations, abbreviations may be used in the four engine layout. A full list of abbreviations is available in Section IV. But usually the previous data page contains the same term without an abbreviation, for example, see the pages with the temperature and pressure of coolant and transmission oil in Figure 3.

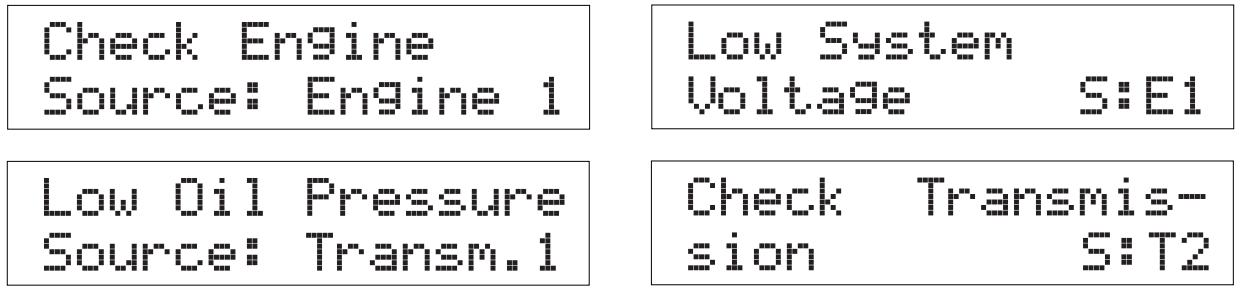

Figure 4. Alerts for engines and transmissions

When a warning or alert from an engine or transmission comes in, the display starts blinking and shows the description and the problem's source. If the description is long, the source is indicated in the lower right corner (see right column in fig.4), 'E' means engine and 'T' means transmission, the number indicating the engine or transmission number (port first, increasing to starboard).

You may disable the alert for three minutes by click any of the Display buttons. You may also block all alerts globally in the Display settings.

III. Menu and Settings

After installing a Display, you may need to choose your preferred units, select the number of engines and tanks, and turn off unnecessary data pages using the Display's menu.

The Device's buttons recognize short and long clicks. By default, they have the following functions:

Buttons	**Short Click**	**Long Click**
Up Button	Scroll up, increase the value	Brightness, menu on/off
Down Button	Scroll down, decrease the value	Menu, item select, change the value

A long click of the Down button in the data pages view calls the Display's menu. To scroll through menu items, use short clicks of the Up or Down buttons (see fig.5).

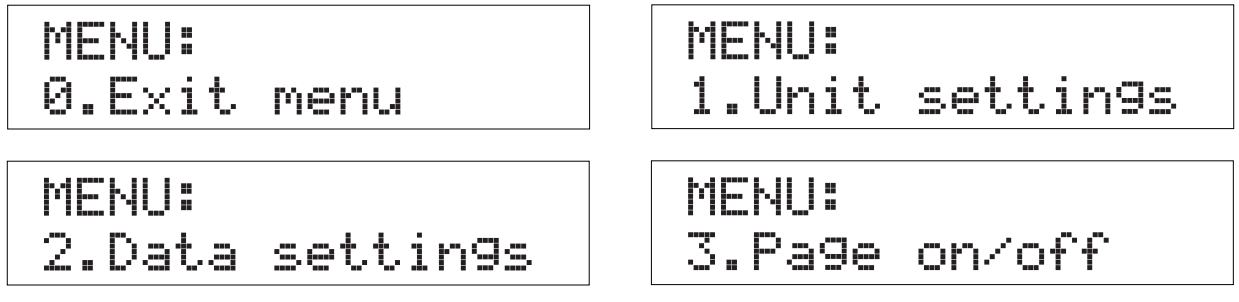

Figure 5. Menu screens

The following items are available in the Display's menu:

1. **Unit settings.** You may choose preferred units for speed, distance, pressure, temperature, volume and fuel rate. In addition to SI units, the following units are available: kn – knots, nautical miles per hour; mph – statute miles per hour; kph – kilometers per hour; nm – nautical mile (1852m); mi – statute mile (1609,344m); km – kilometer (1000m); bar – 100 kPa; psi - pound per square inch; ksc - kilogram per square centimeter; g - US gallon (3.785L).

2. **Data settings.** Here you can set up the number of engines, batteries, tanks, turn warnings and alarms on and off, etc. The Display uses different data page layouts for vessels equipped with one, two, and three/four engines. So, modifying these settings affects data presentation also. This submenu will be described in details below.

3. **Page on/off.** Here you can hide data pages with unnecessary data. Note that in some layouts, data pages are combined. For example, in the layout for one engine, the transmission gear, engine revolutions and engine hours are all shown on one page. So if you hide the "RPM / Gear" page in settings but leave the "Eng. hours" page there, the RPM data bar will still be visible on the shared page.

4. **Display.** Sets automatic shutdown of the screen after user inactivity (default setting is never). When the screen is off, the Device goes into energy saving mode. Press any button to wake the Display up. The Display will also waked up if an engine or transmission alarm arrives.

5. **Factory reset.** Returns to the factory settings. It is not necessary to perform a reset when the firmware type is changed (e.g. from Instrument Display Firmware to this firmware).

6. **Version.** The firmware version and the Device's serial number are displayed there. This firmware always have the suffix "e" at the end of version number. Instrument Display Firmware has the suffix "i".

The "Data settings" submenu has the most important settings for the Display's data page view:

1. **Engines.** Possible values: 1, 2, 4, OFF. This setting defines the layout of data pages with engine and transmission data. In case of 1, only the port engine's data will be available, this layout is also uses the smallest number of data pages. In case of OFF, no engine data is displayed.

2. **Warnings.** Turn on and off engine and transmission alerts and warnings. Warnings blink on the Display's screen and may be cleared for 3 minutes by any button click.

3. **Diesel tank.** Number of tanks to display, possible values: 0-4. Each tank's data are shown on an individual page. Data includes level as a percentage and, if the tank's capacity data are available, the capacity and remaining diesel in liters or US gallons. If 0 is selected, no diesel tank data will be shown to the user.

4. **Gasoline.** Gasoline tanks, details the same as "Diesel tank" above.

5. **Fresh water.** Fresh water tanks, the same as tanks above. Possible values: 0-3.

6. **Black water.** Black water tanks, the same as "Fresh water".

7. **Batteries.** Number of batteries to display, possible values: 1-4, OFF. Each battery's data are shown on an individual page (if the next setting N8 is off). Data includes battery voltage, current and case temperature.

8. **Volts only: ON/OFF.** Most sensors provide only voltage for the battery, but current and case temperature data are not available. If this setting is on, voltage for all four batteries will be displayed on one data page.

The total number of active data pages (visible to the user) depends on the number of selected engines (and the corresponding layout used), number of tanks and batteries to display, the "Volts only" setting, and the number of pages turned off on the "Page on/off" menu.

IV. Supported Data Types

Abbreviations used in the table below: SEL – single engine layout, 2EL – twin engine layout, 4EL – four engine layout. Note that the Display does not compute values (e.g. fuel consumption by fuel rate), it only displays data available in the NMEA 2000 network.

Table IV.1 Data types

Data type	**Abbreviations used on data pages, comments**
Category: Engine	
Engine speed, RPM	RPM in all layouts.
Total engine hours	Clock's symbol is used in 4EL: L, HOURS in SEL.
Engine boost pressure	BOOST or ENGINE BOOST.
Engine tilt/trim	TRIM (at page with alternator's data in 2EL), ENGINE TRIM at other layouts
Engine oil pressure	OIL in 4EL, EN.OIL in SEL.
Engine oil temperature	EN.OIL in SEL.
Engine coolant pressure	CLNT in 4EL. COOLNT in SEL.
Engine coolant temperature	COOLNT in SEL.
Alternator potential	ALTERN in 4EL. ALTR in SEL.
Fuel rate	FUEL with selected fuel rate unit.
Fuel pressure	FUEL with selected pressure unit.

Engine load	
Engine torque	
Alarms and warnings	S:E1 means “Source is the Engine 1” (1 is port, increasing to starboard)
Exhaust gas temperature	EXHAUST GAS in all layouts.
Category: Transmission	
Transmission gear	 are symbols of forward, neutral and reverse; displayed at page with engine’s speed.
Transmission oil pressure	TRAN. OIL in 4EL, TRANS. OIL in 2EL, TR.OIL in SEL.
Transmission oil temperature	TRANSM. OIL is 4EL, TRANS. OIL in 2EL, TR.OIL in SEL.
Alarms and warnings	S:T1 means “Source is the Transmission 1” (1 is port, increasing to starboard)
Category: Vessel’s data	
Speed Over Ground	SOG is used in all layouts
Speed Thru Water	STW is used in all layouts
Trim tabs	PORT – left tab, STBD – right tab, starboard.
Category: Trip fuel	
Time to empty fuel tanks	In hours.
Distance to empty (fuel range)	

Estimated fuel remaining	“FUEL REM.” in all layouts.
Trip run time	“TRIP d.hh:mm:ss” or “TRIP RUN h:mm:ss” while trip is less than 10 hours
Fuel rate, average	FUEL AVG, the sum of all engine’s data.
Fuel rate, economy	FUEL ECO, the sum of all engine’s data.
Trip fuel used	FUEL USED, the sum of all engine’s data.
Instantaneous fuel economy	INST ECO, the sum of all engine’s data.
Category: Tanks	
Level as a percentage	
Level in liters or US gallons	Hidden, if tank capacity is not available in NMEA 2000 network.
Tank capacity	Hidden, if tank capacity is not available in NMEA 2000 network.
Category: Batteries	
Battery voltage	
Battery current	In Amperes, hidden if “Volts only” setting is ON.
Case temperature	Hidden if “Volts only” setting is ON.

V. Data Pages in Different Layouts

This area of the manual describes only the pages affected by the number of engines in settings (layout), and those that may be turned on/off in the “Page on/off” menu. To hide the tanks or batteries pages, set its number in “Data settings” to zero.

Abbreviations used in the table below: SEL – single engine layout, 2EL – twin engine layout, 4EL – four engine layout.

Table V.1 Data pages

Name in “Page on/off” menu	**Description**
SOG / STW	Speed Over Ground and Speed Thru Water.
RPM / Gear	Engine revolutions and current transmission’s gear.
Eng. hours	Engine hours, combines with previous page in SEL.
Fuel rate	
Fuel press.	Fuel pressure, combined with previous page in SEL.
Trim tabs	Port and starboard trim tabs.
Tilt / trim	Engine tilt trim.
Alternator	Combined with previous page in SEL and 2EL.
Coolant	Temperature and pressure, two pages is 4EL.
Engine oil	Temperature and pressure, two pages is 4EL.
Transm. oil	Transmission temperature and pressure, two pages is 4EL.
Exhaust gas	Exhaust gas temperature. One page in all layouts.
Boost pres.	Engine boost pressure. One page in all layouts.
Load/torque	Engine load and torque. Two pages in 4EL, one in other layouts.

V.trip fuel	Trip fuel, vessel. Two pages in all layouts: page with time and distance to empty tanks and page with estimated fuel remaining and trip time.
E.trip fuel	Trip fuel, engine. Two pages with summarized data for all engines.

VI. List of NMEA 2000 Messages

The mandatory messages received and transmitted by the Device are listed in table B1 of Appendix B of the “User Manual of the Text Display YDTD-20N with Instrument Display Firmware” (see Section I). This list contains additional messages processed by this firmware.

Table VI.1 Messages received by Engine and Tank Monitoring Firmware

Message	**PGN**	**Comments**
Engine Parameters, Rapid	127488	For instances 0..4 only
Engine Parameters, Dynamic	127489	For instances 0..4 only
Transmission Parameters	127493	For instances 0..4 only
Trip Fuel Consumption, Vessel	127496	
Trip Fuel Consumption, Engine	127497	For instances 0..4 only
Engine Parameters, Static	127498	Data are not displayed in the current firmware’s version
Fluid Level	127505	Diesel, gasoline, fresh and black water tanks data
Battery Status	127508	
Speed, Water Referenced	128259	
COG & SOG, Rapid Update	129026	For Speed Over Ground only
Temperature, Extended Range	130316	For exhaust gas temperature only
Trim Tab Status	130576	