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SOFTWARE INSTALLATION ON NEW LAP TOP (XP OPERATIVE SYSTEM) WITHOUT SERIAL PORTS

NOTE! Very important, use only USB/serial adapter delivered from Naval.
Naval Electronics AB can not guarantee correct function if other adapter is used.

Installation of software to USB/serial adapter

1. Connect the USB/serial adapter to one of the computers USB ports.
2. Let the computer identify the new device.
3. Install correct adapter drivers, located on enclosed CD.
4. After installation, check the device manager which port has been assign to the adapter. If the port is higher than COM4 it has to be altered.
5. The alteration is made in: Control panel/system/ hardware/device manager/ports/properties/port settings/advanced.

Installation of Navtrack software

1. Install Navtrack software located on enclosed CD in Navtrack manual.
2. After the installation is done, open the ini file and check so that the right COM number is set.

NavTrack unit NT20S

Main menu

Here all necessary information can be seen. A symbol of the ship shows the antenna bearing.

Calibration

The switch on the front panel of the control unit can be set in two positions. If set in Auto mode, all signals go to the control unit. Otherwise all signals from the antenna is bypassed to the manual unit connector at the back. If such a device is connected, the antenna can be manually controlled without any interference from the Navtrack control unit. Through all examples in this manual it is expected that the switch is in the Auto mode position.
Since there are differences in different brands of rotors, a calibration of your actual unit must be performed, to get the highest possible accuracy. Start the program and click on the *Service* button to enter the service form.
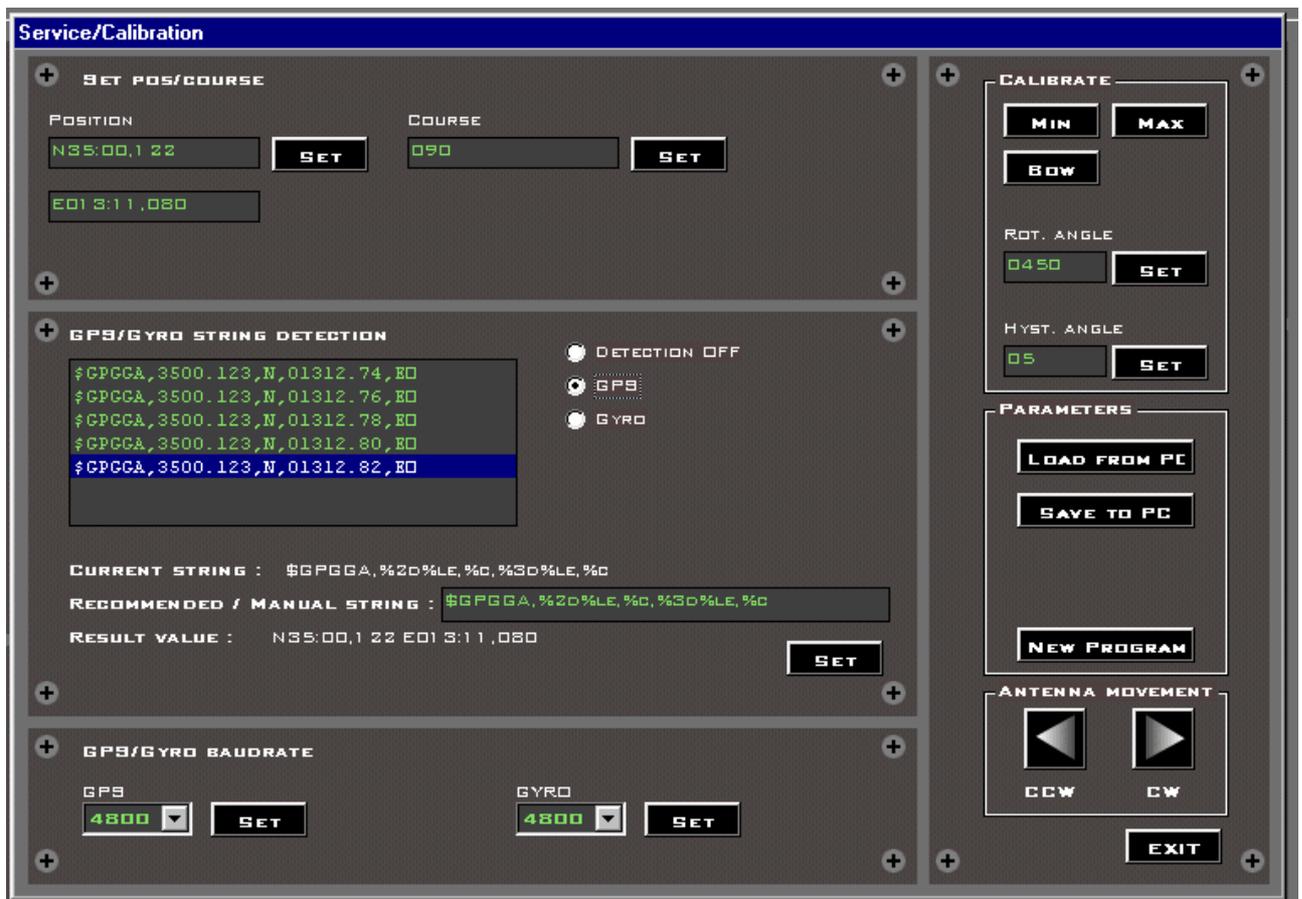
Use the *Left arrow* to turn the rotator to the most counter clock wise position, all the way until the mechanical stop. Click on *Min (<)*. Use the *Right arrow* to turn the rotator in its most clockwise position.
Click on *Max (>).* Use the *Left arrow* to turn the rotator (antenna) to the ships bow (see picture). Click on *Bow*.
The antenna should now point at the bow of the ship.
Enter the total rotation angle of your rotator, e.g. 450 degrees and click *Set*.
Enter hysteresis angle of antenna, min 1° and max 20° and click *Set*.
The hysteresis value determines the antennas tracking sensitivity, 5° is recommended.
Note! If you want the manual unit to show the actual compass bearing you must mount your rotor so that the *Min (<)* calibration is the same as the *Bow* calibration.
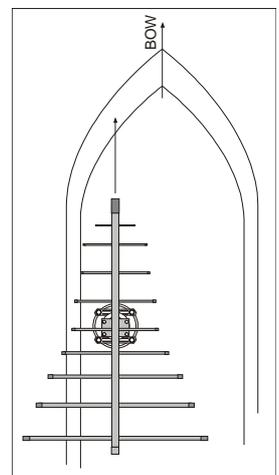
GPS/Gyro string

The antenna needs data from GPS and gyro in NMEA 0183 format to function properly. To interpret the data, control sentences need to be set according to procedure as follows: Highlight the GPS-button and verify that received text is readable. Standard baudrate is 4800 bps if your GPS and Gyro equipment don't use the baudrate 4800 enter new values (1200, 2400 or 9600) and click the corresponding *Set* button.

The computer then suggests a sentence (string) and displays a result value. If this is correct press "Set" .

If no text or random symbols are displayed, check CPU jumper settings and wiring.
Calibration is finished.

Entering station data

Right click on the name of a station. A form pops up on the screen.

Enter the name of the station, and then use the mouse to select high (30 km), Medium (20 km) or low (10 km) power range of the station. Enter latitude and longitude. It is important to enter the position in the same format it is presented in the example. (N35:09,999 E013:10,001).

TV / RADIO STATIONS
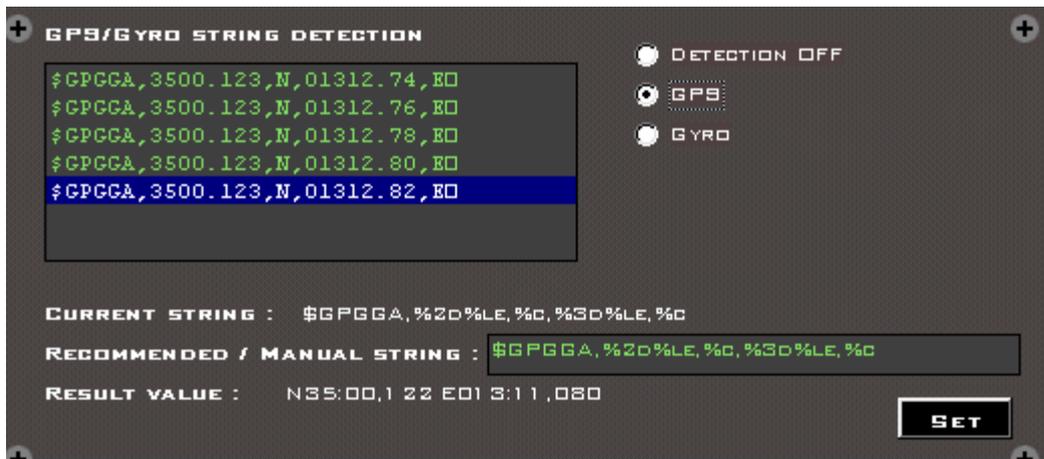
ENABLED	NBR	STATION NAME
ENABLED	00	STATION 1
ENABLED	01	STATION 2
ENABLED	02	STATION 3
ENABLED	03	STATION 4
ENABLED	04	STATION 5
ENABLED	05	STATION 6
ENABLED	06	STATION 7
DISABLED	07	STATION 8
ENABLED	08	STATION 9
DISABLED	09	STATION 10
ENABLED	10	STATION 11
ENABLED	11	STATION 12
ENABLED	12	NULL
DISABLED	13	NULL
ENABLED	14	NULL
DISABLED	15	NULL
ENABLED	16	NULL
DISABLED	17	NULL
DISABLED	18	NULL
DISABLED	19	NULL

Station Settings

ENABLED	NBR	STATION NAME	POWER	LATITUDE	LONGITUDE
ENABLED	00	STATION 1	HIGH	N35:09,999	E013:10,001
ENABLED	01	STATION 2	MEDIUM	N34:49,998	E013:45,000
ENABLED	02	STATION 3	MEDIUM	N34:49,998	E013:45,000
ENABLED	03	STATION 4	LOW	N34:59,999	E010:00,000
ENABLED	04	STATION 5	LOW	N34:59,999	W010:00,000
ENABLED	05	STATION 6	HIGH	N23:03,177	E041:40,482
ENABLED	06	STATION 7	MEDIUM	N55:13,998	E013:00,000
DISABLED	07	STATION 8	HIGH	N12:00,001	W010:00,000
ENABLED	08	STATION 9	LOW	N55:52,029	E012:51,155
DISABLED	09	STATION 10	MEDIUM	N55:27,161	E013:10,420
ENABLED	10	STATION 11	LOW	N35:09,999	E013:10,001
ENABLED	11	STATION 12	LOW	N34:49,998	E013:45,000
ENABLED	12	NULL	LOW	N00:00,000	E000:00,000
DISABLED	13	NULL	LOW	N00:00,000	E000:00,000
ENABLED	14	NULL	LOW	N00:00,000	E000:00,000
DISABLED	15	NULL	LOW	N00:00,000	E000:00,000
ENABLED	16	NULL	LOW	N00:00,000	E000:00,000
DISABLED	17	NULL	LOW	N00:00,000	E000:00,000
DISABLED	18	NULL	LOW	N00:00,000	E000:00,000
DISABLED	19	NULL	LOW	N00:00,000	E000:00,000
DISABLED	20	TEST	LOW	N00:00,000	E000:00,000

ENABLED ☑ NAME: STATION 7 POWER: MEDIUM LATITUDE: N55:13,998 LONGITUDE: E013:00,000

CLOSE   UPDATE

TV station data as channels a.s.o can be found on the web for each country.
For e.g Sweden look at: www.teracom.se
For International look at: www.wrth.com or your national telecom organization.

IMPORTANT: When a station is **updated** the information will be sent to the control unit. This might take a few seconds. In this way, up to 50 different station standards can be preset.
VERY IMPORTANT!! If the Navtrack unit has been switched off, then all the stations must be updated before the unit can work properly.

Operation

When power is applied to the control unit, it starts positioning the rotator as soon as it has detected course and position from the GPS and gyro. If no GPS and gyro are connected, this can be entered in the **Service** form. This will, however, only work as long as the ship is not moving. For automatic function, information of position and course are continuously needed for operation. By pressing the button **Manual** the unit can be manually controlled by using the arrow buttons. Press **Auto** to get into automatic mode again.

Tracking

The position and course of the ship are received from the GPS and gyro. From the station settings the system gets the position and power for the different stations.
When the system is put into **Auto** mode the antenna will be pointed at the station in whose power range the ship is located. A red arrow will indicate which station is being tracked. If the ship is outside of all station's power range, it will be directed towards the closest one. A blinking red arrow will indicate this. If conditions are good, there might still be a chance of receiving enough signal to get an acceptable reception.
Notice, the system is never tracking for the best signal strength. The antenna is always directed towards the position of the station set in the **Station settings**. Due to this, it is very important that the positions of the stations are correctly entered.
When the ship leaves the power range of a station the antenna redirects for a new station. If the ship has made a continuos turn for more than 450 degrees, the antenna has to do an unwind. This is done automatically and within 1 minute it will be back in correct direction.
If for any reason a station, normally used, is not wanted at the moment, the station can be disabled by a left click in the option box for the station. Another click enables it again.
This can be useful when the ship is leaving a station's estimated power range, but still has good reception. If one does not want an automatic change to next station, which perhaps doesn't have the same channels, this can be manually disabled as mentioned above.
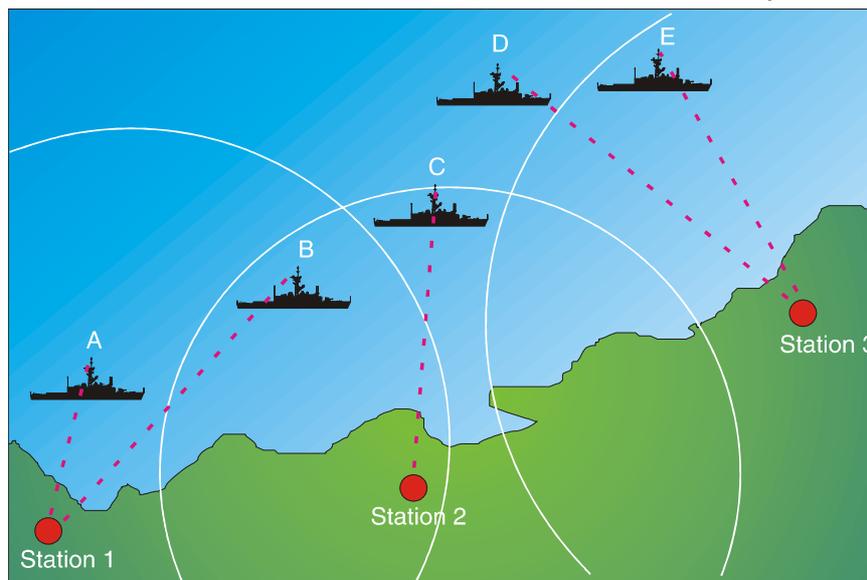
Example of tracking along a coast line.

A: Antenna is directed at Station 1
B: Ship has entered the power range of Station 2 but is still within Station 1 power range.
C: Ship has left Station 1 power range and changes to Station 2.
D: Ship is outside of all stations power range, and is directed towards the closest one.
E: Antenna is within Station 3 power range.

Jumper settings for RS232 and 485/422 on CPU-board

Signals from Gyro and GPS can be connected via an RS232 or RS485/422 interface independently of each other. PC can only be connected via RS232 or 422.

RS232

RS485-422
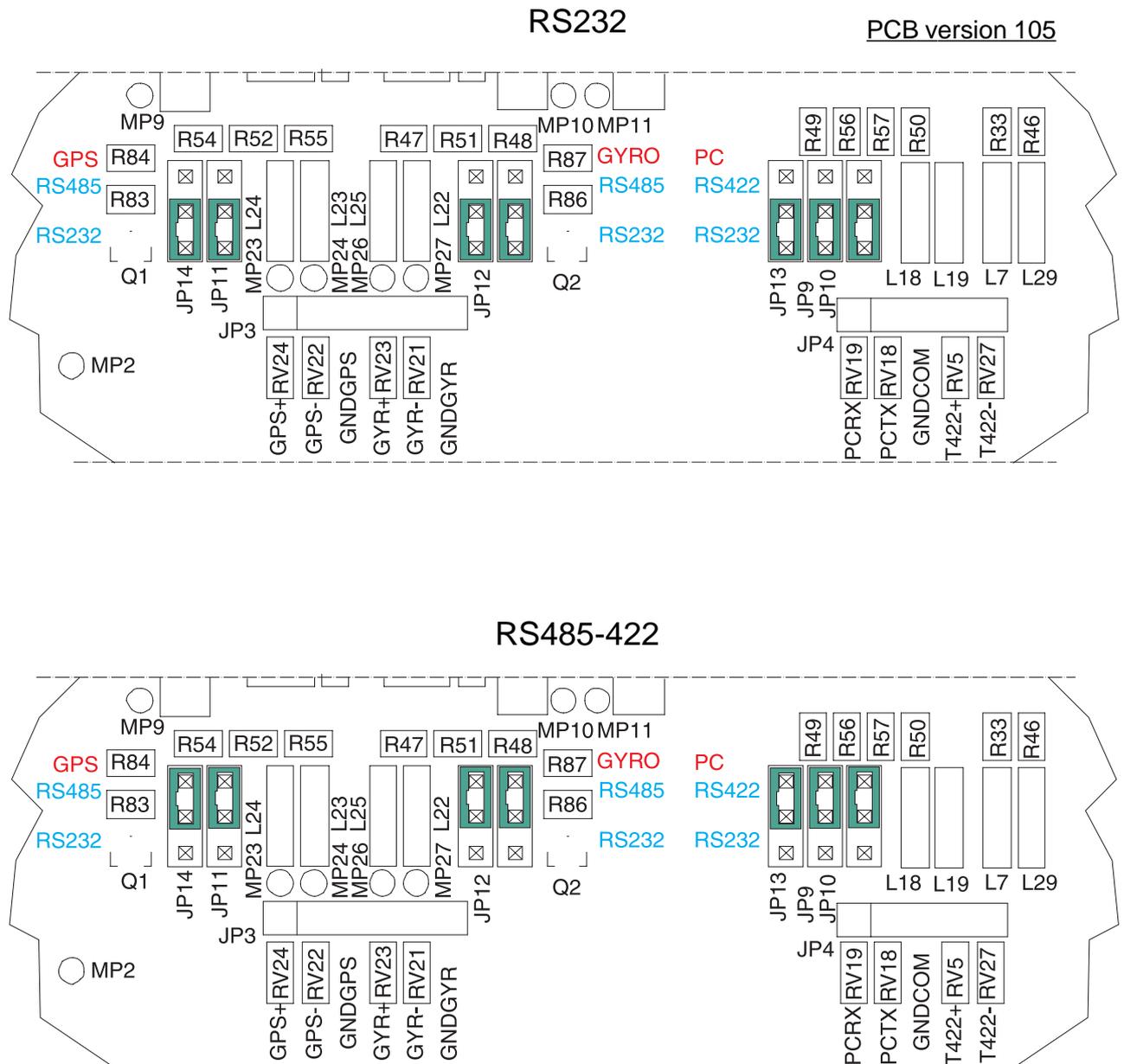
Connections of the control unit NT20S

1.   +24V
GND. GND

GND   3

PC
2. TXD
3. RXD
5. GND
6. T422+
7. T422-

422   232

GYRO
2. Gyro- ── 422/485
3. Gyro+ (RXD)
5. Gyro GND ── 232

GPS
2. GPS- ── 422/485
3. GPS+(RXD)
5. GPS GND ── 232

Antenna
1. +Pot
2. Pot
3. GND Pot
4. Motor 1
5. Motor 2

Manual unit
1. +Pot
2. Pot
3. GND Pot
4. Motor 1
5. Motor 2

250022-L2;01
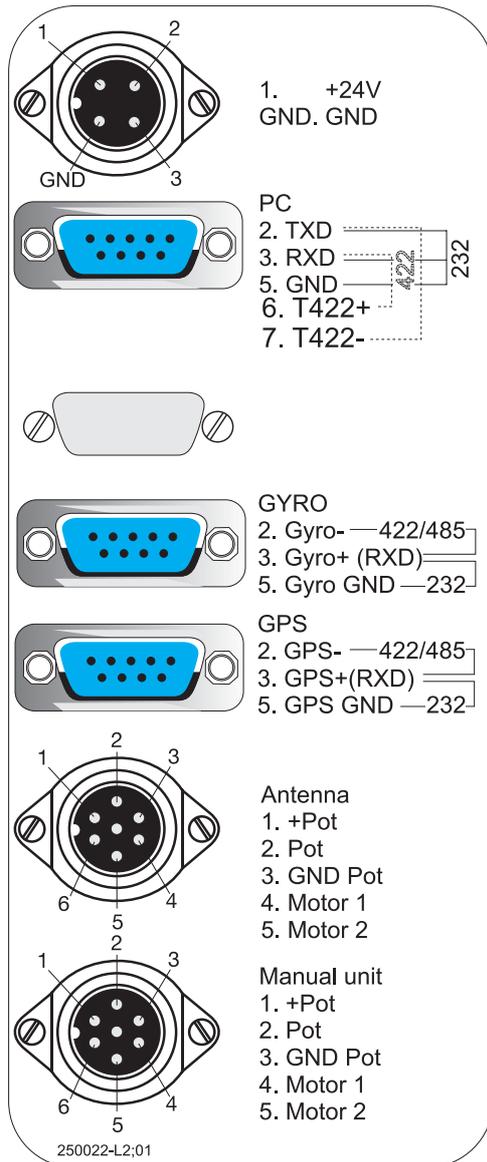
NOTICE VERY IMPORTANT!
POWER SUPPLY
The 24V DC power supply shall also meet the rotor drain.
See specification for rotor

Schematic diagram over auto/man switch

Rotater

Manual unit

N

W   E

S

Pot
Man   Auto

JP2-3
Pot

+Pot
Man   Auto

+5V

Motor 1
Man   Auto

JP5-4(LNB)
+24V ── 1
CPU-board

2

Motor 2
Man   Auto

GND Pot

Switch

JP5-2(PWCS)
CPU-board ── 4

3

5

The schematic has labels: Rotater, Manual unit, N, W, E, S, Pot, Man, Auto, JP2-3 Pot, +5V, +Pot, Motor 1, Motor 2, GND Pot, Switch, JP5-4(LNB) +24V CPU-board 1, 2, JP5-2(PWCS) CPU-board 4, 3, 5.
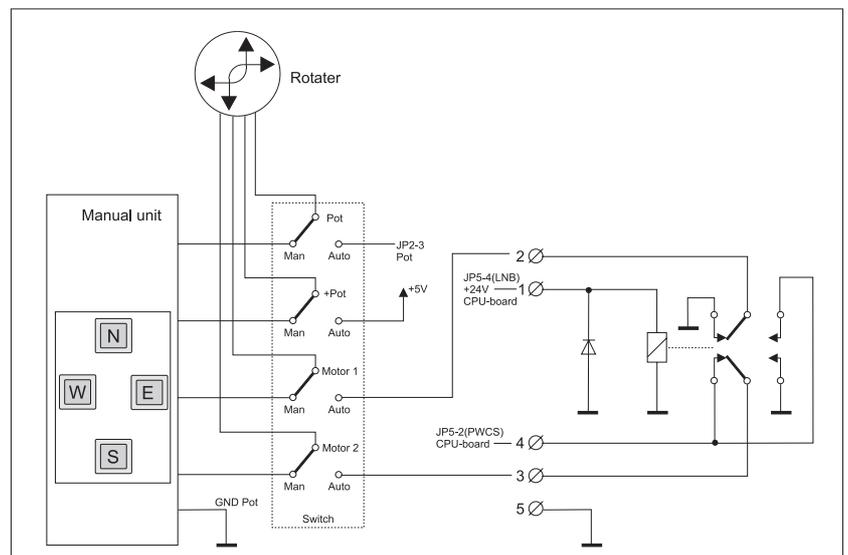
Cables

Cable power supply

view from back

GND   1

+24V (Brown)
GND (Blue)

Grounded 3-pol.
female connector

Cabel 2 x 0,75mm^2
Length= 2000mm

Cable manual unit

view from back

2
1   3

1. +Pot (Black or marked with 1)
2. Pot (Red or marked with 2)
3. GND Pot (Yellow or marked with 3)
4. Motor 1(Green or marked with 4)
5. Motor 2 (Blue or marked with 5)

4

Not connected   5

6-pol.
female connector

Cabel 5 x 0,5mm^2
Length= 2000mm
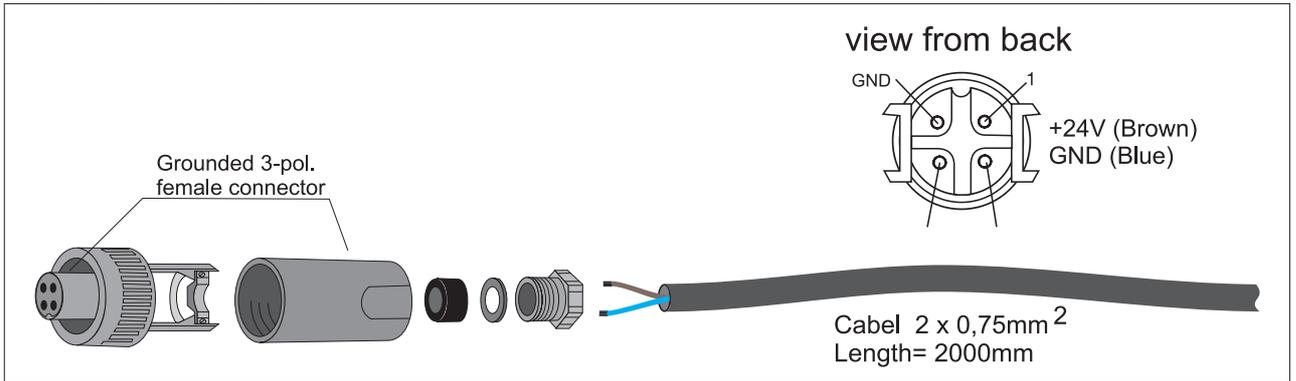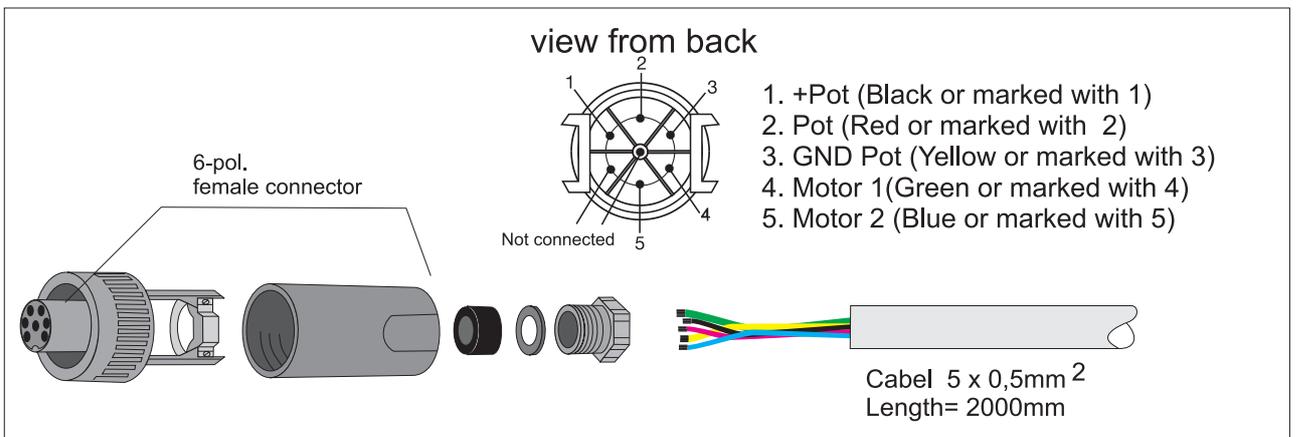
Cable connecting PC to NavTrack unit

2. TXD (Pink)
3. RXD (Yellow)
5. GND (Green)

2. TXD (Pink)
3. RXD (Yellow)
5. GND (Green)

D-sub 9 pol female view
from soldering side

Cabel 6 x 0,25mm^2
only 3 wires are used
Length= 2000mm
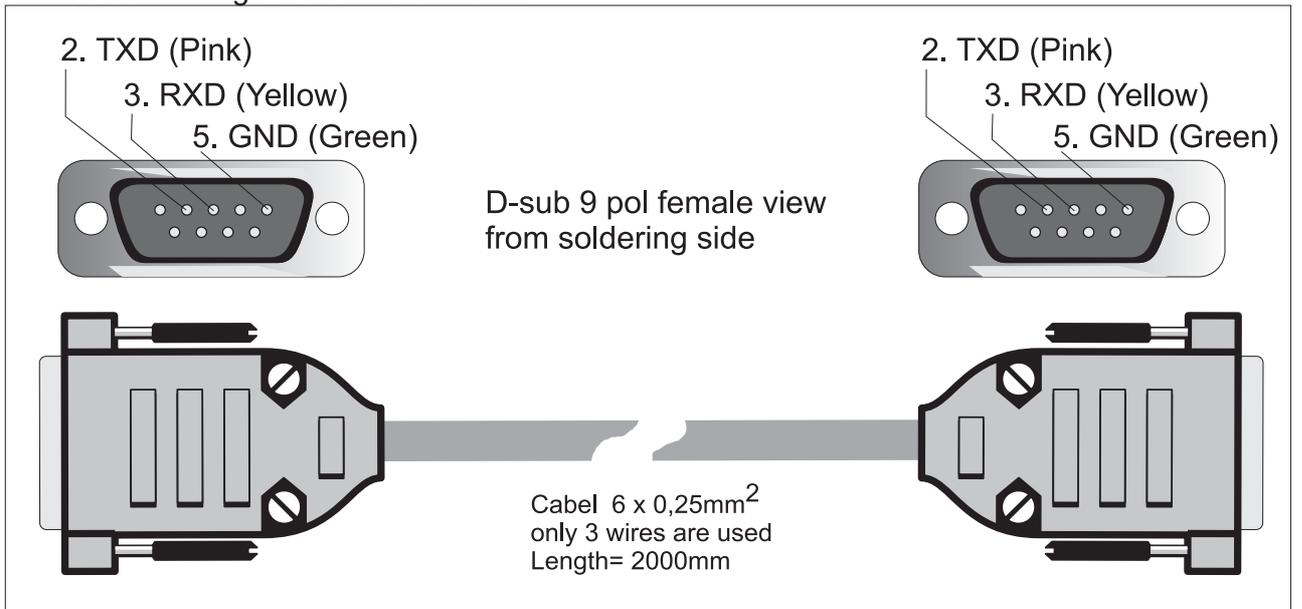
Technical specifications NavTrack NT20S

Physical dimensions

Width: .... 52 mm (10 TE)
Heigth: .... 262 mm (6 HE)
Depth:...................................... 160 mm
Weight: .... 29 kg

Required input

GPS: .... NMEA 0183
Gyro:....................................... NMEA 0183
Baudrate: 1200, 2400 4800, 9600
Data interface PC: RS232/422
Data interface GPS, gyro:......... RS232/422/485

Electrical

Voltage control unit NT20S: .... 24 V DC −10/+15%
Current control unit NT20S: .... 100 mA
Voltage rotor: .... 24 V DC −10/+15%
Current rotor: .... 2-10 A depending on rotor fabricate

Environmental

Temperature – operation .... 0 to 55°C
Humidity: .... 0-100 %

Control computer - requirements

Processor: .... Pentium II or higher
Operating system: .... Windows XP
Internal memory: .... 64 Mb
Hard disk: .... Free space 100 Mb
Video&graphic card: .... 16M colors

Short form for installation and set up

INSTALLATION

1. Mount the rotor. See information enclosed with the rotor unit.
   Note! If you want the manual unit to show the actual compass bearing you must mount your rotor so that the Min (<) calibration is the same as the Bow calibration.

2. Mount the Navtrack unit in a 19" rack or with two mounting brackets (Naval no:164.144).

3. Connect the 6+1 way connector with cable (delivered with the Navtrack unit) to manual connector on Navtrack. For connection to manual unit, see schematic delivered with manual/ rotor unit.

4. Connect cables to the other 6+1 way connector delivered with the Navtrack . For correct connection see connection diagram on Navtrack unit "Antenna". Cable area is depending on rotor type and length of the cables. For correct cable type, consult manual delivered with rotor unit.

5. Connect the ships gyro signal to the 9 pin D-sub connector "Gyro". Connect the GPS connector to the ships GPS signal. The Navtrack default settings for gyro/GPS is RS232 please see Navtrack manual page 8.

6. Connect 24 V DC to the 4-way connector, brown (+). Power supply shall meet the rotor drain. See manual for rotor.

7. Connect the PC laptop with the Navtrack unit. Use the delivered cable with the two 9 pin D-sub connectors.

START/ SET UP

1. Install the Navtrack software on the PC laptop (CD-ROM). For correct installation see Navtrack manual page 3.

2. Switch on the Navtrack power supply. Set switch on Navtrack front in position "AUTO".

3. Start Navtrack program on the PC.

4. **Click on "service menu"**
   4.1 Calibrate the system, see Navtrack manual.
   4.2 Enter the position and course for the ship. Don't forget to press button "set" after entering   the values.
   4.3 For correct input feeding see manual. Enter gyro string, press "set".
   4.4 Enter GPS string, press "set". For correct input feeding see manual.
    For correct settings of GPS/gyro baudrate consult the documentation on the ship for GPS and gyro. Before closing the "service menu" press button "save on PC".

5. **"Entering station data"**. See manual. Don't forget to press button "update" after entering the values. Close window and repeat the procedure until all stations are entered.
   VERY IMPORTANT!! If the Navtrack unit has been out of power, then all the stations must be updated before the unit can work properly.

6. "Main menu". To choose station, tic box in front of station name.

7. The Navtrack unit now starts to search for the station. When found the rotor stops. According to the ships movement the unit now starts to track. If the unit is not tracking, you have to check that the unit receive correct signals from GPS and gyro.

Appendix A gyro- and GPS sentences

In order for the system to function properly, it needs heading and position data from the ship's gyro and GPS. This data is read into the control computer by copying parts of the gyro's and GPS's NMEA 0183 data sentences and using standard ANSI-C commands for variables. Commands in question are:

%le	read a decimal number	e.g.	123.456 ⇒123.456
%d	read one figure	e.g.	123.456 ⇒1
%2d	read two figures	e.g.	123.456 ⇒ 12
%c	read a character	e.g.	ABC.123 ⇒ A
%2c	read two characters	e.g.	ABC.123 ⇒ AB

To disregard characters the command %*nc (n=1,2,3...) is used in combination with other commands.

%*2c,%c	disregard 2 characters, read one char.	e.g.	ABC.123 ⇒ C
%*4c,%le	disregard 4 characters, read a number	e.g.	ABC.123 ⇒ 123

Gyro

Required data: Heading in degrees to one or more decimal places, e.g. 298.2

A typical gyro sentence may look like this: $HEHDT,212.602,T*2A where 212.602 represents the useful data. In "$HEHDT" "HE" may be replaced by other two-letter combinations.

Sentence to enter into the computer: **$HEHDT,%le** or **$%*2cHDT,%le**

GPS-position

Required data: Latitude in degrees (2 digits) minutes with or without decimals, N or S (representing north or south).
Longitude in degrees (3 digits) minutes with or without decimals, E or W (representing east or west)

Useful GPS data comes in either GLL-sentences or GGA-sentences or both. GLL-sentences are easier to use.

A typical GLL data sentence may look like this:
$GPGLL,5522.0387,N,01309.2531,E,085643.123,A*2C

A typical GGA data sentence may look like this:
$GPGGA,085643.00,5522.0387,N,01309.2531,E,1,08,00.9,00.........

The difference is that the GGA sentence begins with a time hhmmss.ddd (number of decimals vary). The two letters ahead of GLL/GGA can vary.

The useful data in the sentences are 5522.0387 {55° 22.0387 minutes} N {north}
01309.2531 {013° 09.2531 minutes} E {east}

Sentence to enter into the computer: **$GPGLL,%2d%le,%c,%3d%le,%c**
if no GLL information is available then enter **$GPGGA,%*9c,%2d%le,%c,%3d%le,%c** and modify "%*9c" depending on the number of decimals in the time data.

SOG - speed over ground

Required data: SOG in knots with or without decimals.

A GPS data sentence containing SOG information may look like this:
$GPVTG,342.52,T,,,014.72,N,027.28,K*1F

The useful data in this sentence is 014.72 {knots}
Sentence to enter into the computer: **$GPVTG,%*10c,%le**