



NavNet Installation Guide Version 1.06

READ ME FIRST!

This document is being included with your NavNet Display as a supplement to the standard Installation Manual.

-If your NavNet System is already installed and operational, this document will not be required.

-If you only need help configuring the software of the NavNet System, please begin at Section 4.

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AP-1 "QUICK SOFTWARE SETUP" – Basic Software Setting Procedures For Single Display NavNet Configurations

AP-2 NavNet "Quick Reference" 2-Page Guide for Experienced NavNet Installers

Note: The list prices provided in this document are for reference only and are subject to change at any time.

Section 1 - Explanation of the NavNet Concept

NavNet (Furuno Navigation Network) products are the first Furuno products that utilize TCP/IP protocol over standard 10BASE-T Ethernet to share radar/chart/sounder images and other navigation information from devices connected within a networked system. In any single NavNet, a combination of up to **five** Furuno NavNet Network Components may be connected to each other (Up to Four Displays and One Network Sounder). All NavNet Network Components have one integrated 10BASE-T Ethernet port. Each NavNet Network Component utilizes a Furuno 6-pin waterproof plug for its Ethernet connection.

Defining NavNet Network Components

NavNet Network Components

- Any NavNet Display
- Network Sounder (BBFF1)

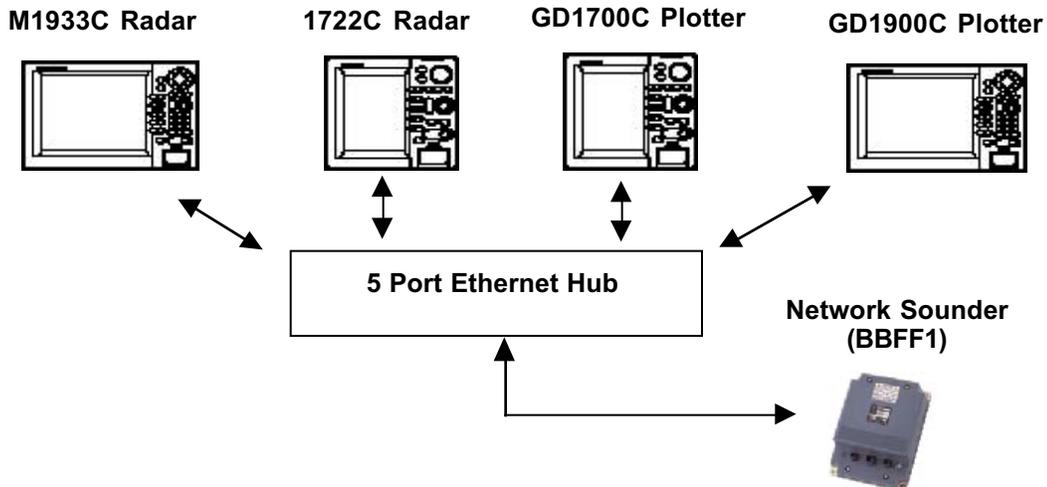
Non-NavNet Network Components

- GPS Sensors
- Heading Sensors
- Smart Temp/Depth Sensors
- RD30 Displays

Any NavNet Radar/Plotter or Plotter may be used independently as a stand-alone product! Additionally, it may be connected to any other NavNet Display or Network Sounder to form a sophisticated navigation system. If only two NavNet Network Components are connected together, a single bi-directional cable can be inserted between them to establish full network communication via their Ethernet ports. However, if three, four, or five NavNet Network Components are networked together, an Ethernet Hub must be utilized.

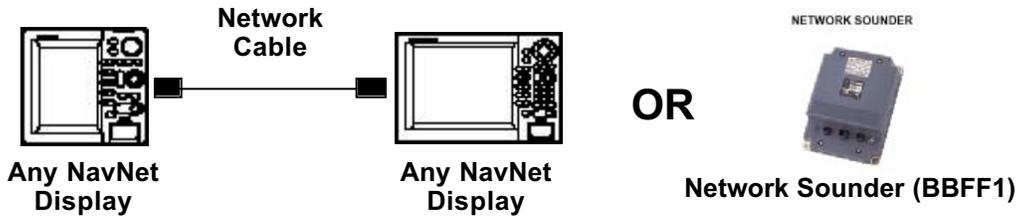
- Up to 5 NavNet Network Components Per Network Is Permitted!
- The Network Sounder (BBFF1) Must Be Used With at Least One NavNet Display!

Example of a of Five Network Component NavNet System



Section 2 - The Three NavNet Cabling Options & CAT5/RJ45 Installation Notes

- Option #1 - "Point-to-Point" With Two NavNet Components**



When two NavNet Ethernet components are connected together, a single cable may connect the Network Components. Refer to the list below for the appropriate length cable. Utilizing any of the Furuno "6 Pin-to-6 Pin" Network Cables listed below is the simplest way to network any two NavNet Network components.

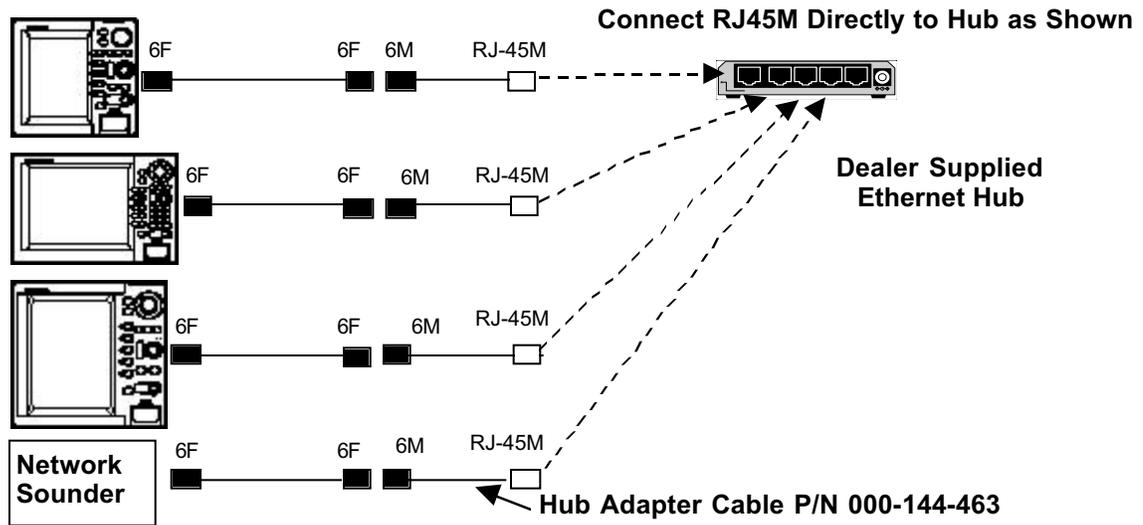
Please note that the Network Sounder is supplied with a standard 5 Meter Network Cable (000-144-422).

TABLE 3.1

<i>Part Number</i>	<i>Description</i>	<i>List Price</i>
000-144-421	NavNet Ethernet Cable 1m 6P(F) - 6P(F)	\$50.00
000-144-422	NavNet Ethernet Cable 5m 6P(F) - 6P(F)	\$70.00
000-144-423	NavNet Ethernet Cable 10m 6P(F) - 6P(F)	\$100.00
000-144-424	NavNet Ethernet Cable 20m 6P(F) - 6P(F)	\$150.00
000-144-425	NavNet Ethernet Cable 30m 6P(F) - 6P(F)	\$200.00

- **Option #2 – Furuno Network Cables With Ethernet Hubs**

Example of NavNet Installation Using Furuno 6-Pin Female-to-Female Cables and Furuno Hub Adapter Cables (6-Pin Male to RJ45 Male)



This cabling option allows Furuno NavNet Cables to be utilized for any NavNet when an Ethernet 10BASE-T Hub is required for a multi-component NavNet system. Use the same cables as listed in Table 3.1 for connection to each NavNet Component. This option might be beneficial for certain installations because it provides a waterproof Furuno cable up to the Ethernet RJ45 Hub connection.

Furuno Cable Selection Steps:

- Select a proper length cable from Table 3.1 (Page 3) for EACH NavNet Display or Network Sounder.**

Each cable must be routed to a suitable location where the Ethernet Hub will be mounted.

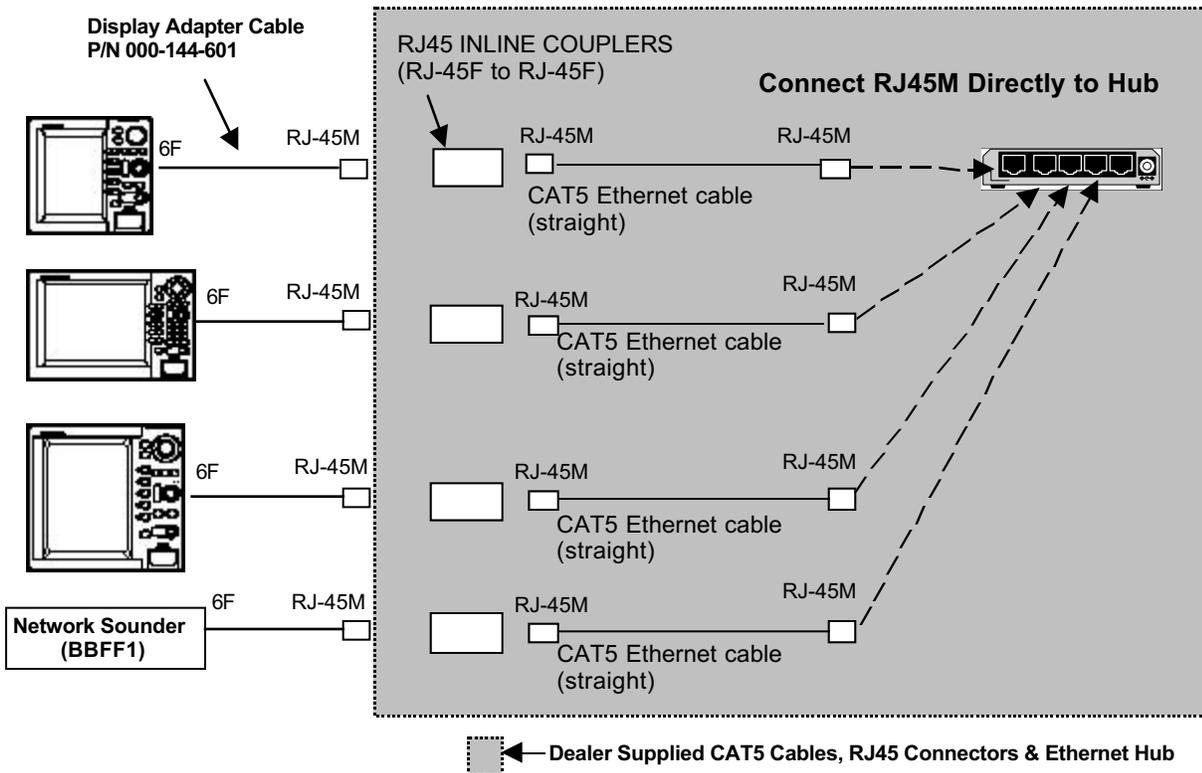
Note: The Ethernet Hub Connection will not be completely weatherproof unless the hub is installed in a weatherproof box. Please pay careful attention to the mounting location and installation of the hub.

- Utilize one “Furuno Hub Adapter Cable” for each NavNet Component. A Hub Adapter Cable is a 0.5 Meter Cable that will convert the 6 pin Furuno Plug to a Male RJ45 connector. This RJ45 connector will then plug directly into any 10BASE-T Hub.**

000-144-463 Hub Adapter Cable 0.5m 6P(M)-RJ45(M) List Price \$45.00

• Option #3 – Utilizing CAT5 Cable for NavNet Installations

Example of NavNet Installation Using CAT5 Cables and Furuno 6-Pin Female-to- RJ45 Male Display Adapter Cables



This type of installation requires the use of Furuno Display Adapter Cables. It is possible to create a NavNet that only uses display adapter cables if the hub is mounted very close to the NavNet Displays and Network Sounder. It is also possible to “Mix” cabling Options #2 and #3 to create a NavNet.

When longer cable runs are required, it will be necessary to utilize CAT5 Network Cable for NavNet Installations. Utilizing CAT5 Cabling provides flexible installations and allows a vessel to be pre-wired during construction or in preparation for a future NavNet installation.

-Waterproof integrity of dealer supplied CAT5 Cabling and/or connections is NOT guaranteed by Furuno and must be performed by the installer.

-Exact CAT5 Network Installation Methods and Practices are MANDATORY! Please see our “CAT5/RJ45 Installation Notes” below for help on this subject

All CAT5 Cables must be wired as “Straight” cables, because the connection will always be made directly to the Ethernet Hub. “Straight” CAT5 wiring information will be provided in the “CAT5 Cable Installation Notes”. Detailed information may also be found by using our references in the Internet Resources section on page 8.

- C. Stranded or Solid Core CAT5 Cable is OK** – For Cable lengths of up to 50 meters, Stranded Core CAT5 Cable is OK and might be more suitable for high vibration installations on smaller vessels. Solid Core CAT5 is also OK and should be used on cable runs longer than 50 meters from a NavNet Display or Network Sounder to an Ethernet Hub. Never exceed 80 Meters on a CAT5 cable run.
- D. CAT5e Provides Better Interference Protection than Standard CAT5** – Enhanced CAT5 (CAT5e) cabling is better to use than standard CAT5 Cable and is preferred for NavNet installations. It costs only a few cents more per foot.
- E. CAT5 Cabling Should NOT be Installed in Parallel with Power Cables** – Try to run CAT5 cabling independently from large power cable bundles, neon lights, or other sources of EMI. Even a small separation from power cables provides enough separation to reduce interference.
- F. CAT5 Cabling Should Only Be Terminated With an RJ45 Connector** – NEVER use any other kind of connector or normal terminal strip for CAT5 cables. The network will simply not function if this is done. “110” Punch Down Blocks are acceptable. Check our web resources on page 8 for more information.

RJ45 Connector Installation Notes:

- A. NEVER untwist CAT5 Cable for more than 0.5 Inches When Installing RJ45 Connectors** – The twist in the wire pairs is critical for CAT5 Networks.
- B. Use Quality RJ45 Crimping Tools and Thoroughly Inspect All RJ45 Crimps** – Follow the Crimping Procedures listed in our www resources for more information.
- C. Only “Straight Through” Cable Sections Are Required** – When using Furuno “Display Adapter Cables” in a multi-component NavNet System, only “Straight Through” RJ45 terminations are utilized. Hubs use straight connections.
- D. Follow only TIA/EIA-586 Wiring Standards** – This means that wire colors and pin assignments for the RJ45 connector must be consistent throughout the network. Follow the CAT5 Wire Pair Color and Pin Assignments listed below. Even though only two pairs are utilized, all four pairs MUST be crimped!!

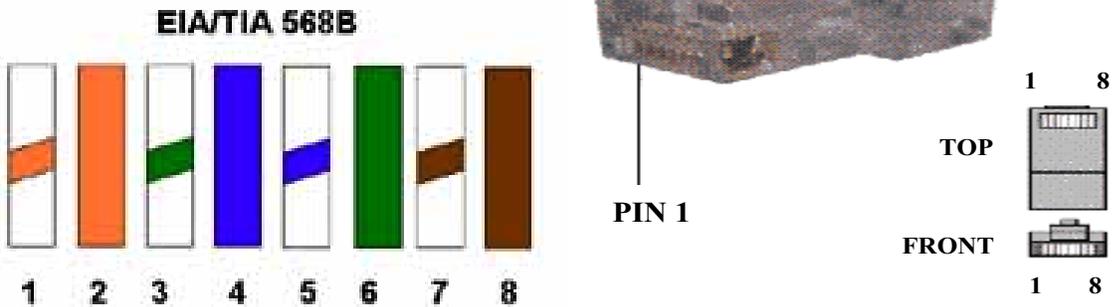
CAT5 Pair Colors

Pair 1	WHITE-BLUE BLUE
Pair 2	WHITE-ORANGE ORANGE
Pair 3	WHITE-GREEN GREEN
Pair 4	WHITE-BROWN BROWN

Pin Assignment Colors (EIA/TIA 568B)

Pin 1	- WHITE-ORANGE----	TRANSMIT “+”
Pin 2	- ORANGE-----	TRANSMIT “-“
Pin 3	- WHITE-GREEN-----	RECEIVE “+”
Pin 4	- BLUE	
Pin 5	- BLUE-WHITE	
PIN 6	- GREEN-----	RECEIVE “-“
PIN 7	- WHITE-BROWN	
PIN 8	- BROWN	

NOTE: Identifying The Pin Assignment of an RJ45 Connector - PIN 1 is at the LEFT when looking at the “Flat Side” of an RJ45 with the cable entry at the bottom



1-White w/Orange Stripe, 2-Orange, 3-White w/Green Stripe, 4-Blue, 5-White w/Blue Stripe, 6-Green, 7-White w/Brown Stripe, 8-Brown

• Internet Resources for Ethernet Network Installations

The Internet is an excellent source for Network Installation Information. Here are some www sites that offer information and free training courses as well.

CABLEU.NET –
www.cableu.net

Uncle Ted’s Guide to Communications Wiring –
www.cableu.net/uncleted/uncleted.htm

Networking Cable Info -
www.peakaudio.com/CobraNet/Network_cabling.htm#cable_plant

SECTION 3 – Ethernet Hubs and Hub Power

A. General Ethernet 10BASE-T Hub Information

Furuno NavNet Network Components utilize standard IEEE 802.3 Ethernet 10BASE-T Ports. This simply means that any Ethernet 10BASE-T Hub can be utilized for NavNet Products. Every Ethernet 10BASE-T Hub has multiple connection ports for individual network connections. When NavNet Products use a Network Hub, we say that the configuration of the network is a “Star”, where the Hub is the central location. Furuno recommends using 4, 5, or 6 port 10BASE-T hubs because they consume low amounts of power, cost less than \$40, are widely available throughout the world, and are physically small in size to simplify mounting. The hubs that Furuno will specify all consume less than 0.25 Amps@12VDC. By definition, every 10BASE-T Hub has ports that utilize RJ45 modular connectors.

Hubs are robust products that protect the integrity of the network. Both hardware and data protection is provided by the hub. The Hub will automatically disable a network port that has a shorted cable while the remainder of the network will still function. Hubs will also protect the network from a Network Component that is placing bad data on the network or has timing problems. Hubs also provide excellent feedback for technicians because they have LCD Indicators for each individual port. Port activity and functionality can be determined by a simple visual check of the hub itself! No other type of common high speed Network provides this kind of “Network Watchdog” capability. This is the reason that about 95% of all new Networks installed throughout the world are Ethernet based.

B. Powering The Ethernet Hub

In general, there are two methods to supply DC hub power in a NavNet System. These methods are listed below:

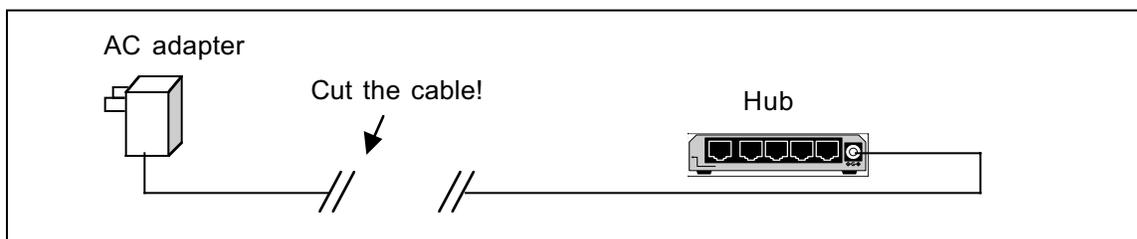
- **Hub Power Method #1 – Power the Hub directly from a NavNet Display**

-Each NavNet Display has two 12VDC Power Outputs that can EACH safely supply a maximum continuous current output of 250mA or 0.25 Amps.

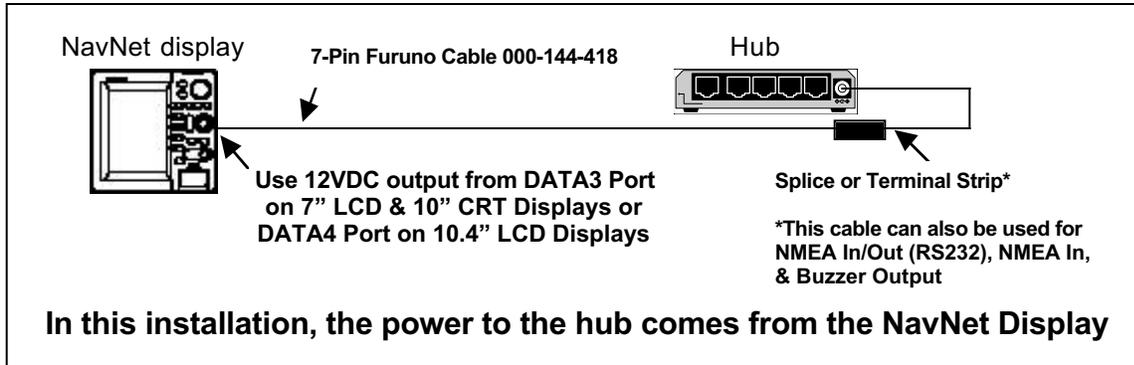
-One 12VDC Output is located on Port 1 of every NavNet Display. This output is usually reserved for powering a GPS or DGPS Position Sensor, such as the BBGPS or GP36.

-The other 12VDC Output can be used to supply power to the Hub and is found at DATA3 or DATA4 of a NavNet Display.

STEP #1 – Cut Power Cable and Separate From AC Adapter



STEP #2 – Use a terminal strip to connect the Hub Power Cable to the NavNet 12VDC Output Cable. Choose a “Primary NavNet” Display to use for Hub Power. This display will have to be turned on for the Hub to work!



Use the “DATA3” or “DATA4” 7-Pin (NMEA In, RS232 I/O, 12VDC Out, Buzzer) data port on the rear panel of the NavNet Display to power the hub. The proper cable for these ports is the 000-144-418 Cable:

000-144-418 NMEA In/RS232C Out/Buz. Out/12VDC Out Cable List Price \$55.00

The “DATA3” and “DATA4” 7-Pin data port PIN ASSIGNMENTS are listed below and the wire colors for this cable are also listed.

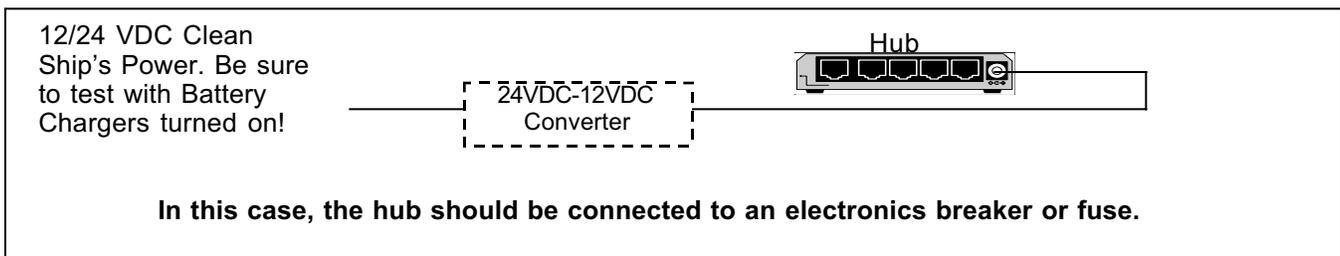
(WARNING! - The “DATA1” Port Pin Assignment is NOT THE SAME as the “DATA3” or “DATA4” Port Pin Assignments. Be Careful!)

000-144-418 Cable Color Code

PIN #1 – TD	WHITE	RS232C “+” to PC or NMEA Output
PIN #2 – RD	BLUE	RS232C “-“ to PC
PIN #3 – NMEA In “+”	YELLOW	NMEA Input (SMART DEPTH SENSOR or OTHER)
PIN #4 – NMEA In “-“	GREEN	NMEA Input (SMART DEPTH SENSOR or OTHER)
PIN #5 – “+”12VDC	RED	12VDC OUTPUT (250mA Maximum Current Out)
PIN #6 – Buzzer Out	BLACK	Buzzer Output to Relay or Other
PIN #7 – GROUND	SHIELD	USE BARE SHIELD FOR +12VDC & RS232C GND

• **Hub Power Method #2 – Power the Hub from Ship’s 12VDC through a Fuse or Breaker**

The Ethernet 10BASE-T Hubs we suggest will have no problems when powered from 12VDC Power through a breaker. If you have a larger 24VDC vessel, use a 24VDC-12VDC Voltage Converter or power the hub directly from the ship’s stable AC source using the supplied 110VAC Adapter.



C. Weatherproofing The Ethernet Hub

Depending on the mounting location for the hub, it is strongly recommended to weatherproof the Ethernet hub by placing it in a splash-proof or waterproof box.

Hubs have no settings or adjustments, so there should not be a reason to access them after installation other than to confirm or check the status of the network.

Ethernet hubs and RJ45 connectors all have gold plated contacts that will not corrode.

We are actively working on a “Furuno Supplied Weatherproof Hub”. It will consist of one of our approved hubs mounted in a waterproof housing. Until this hub is available, please be sure to arrange a suitable way to prevent water damage to the hubs that you install.

D. Approved Ethernet 10BASE-T Hubs and Hub Information

Furuno will only specify 4, 5, or 6, port Ethernet 10BASE-T hubs that we have tested and can be powered directly from the +12VDC Output of any NavNet Display. However, technically, any Ethernet 10BASE-T or 10/100BASE-T Hub is compatible with NavNet Products. If you have a stable power source available any hub will work.

DANGER: Do Not Attempt to Source More than 250mA from either of the two NavNet Display 12VDC Ports. Each Port can safely supply 250mA for connected sensors or hubs (i.e. BBGPS & Hub, BBGPS & Smart Sensor, GP36 Sensor Mode & Hub, etc...)

- The hubs below consume less than 250mA@12VDC and are OK to be powered by any NavNet Display. They can also be powered by +12VDC directly.
- Do not use “Dedicated Uplink” Ports on any Hub
- The Black/White Stripe Wire from AC Adapter is +12VDC on the hubs below

- [NETGEAR 4-Port Hub #EN104TP](#) [CompUSA SKU #188491](#) Approx. - \$26.00
- [NETGEAR 6-Port Hub #EN106TP](#) [CompUSA SKU #220272](#) Approx. - \$35.00

Netgear Install Notes:

- Use “Normal” Position if using “Uplink” port
- Small Size and Metal Cases allow easy mounting
- Call 1-888-305-7440 to Purchase this Hub Directly from Netgear

- [3Com 3C16704A 4-Port Hub](#) [CompUSA SKU #273623](#) Approx. - \$40.00
- [3Com 3C19260 4-Port Hub](#) [CompUSA SKU#270848](#) Approx. - \$30.00

3Com Install Notes:

- Use “Normal” Position if using “Uplink” port
- 3Com Hubs are a little large compared to NETGEAR
- Call 1-877-949-3266 to purchase these Hubs directly from 3Com

- [DLINK 5-Port DE-805TP/C](#) [CompUSA SKU #123123](#) Approx. - \$30.00
- Don't Use Dedicated Uplink Port
- Small But Might Be Difficult To Mount

Section 4 - Easy 4 Step NavNet Software Settings

ATTENTION INSTALLERS: READ THIS INFORMATION BEFORE YOU INSTALL AND CONFIGURE ALL NAVNET DISPLAYS!

In order to simplify all NavNet Software Settings and avoid confusion, we **strongly** recommend that NavNet Installation Software Settings be performed in the following steps:

NOTE: This procedure differs slightly from the one contained in the current NavNet Installation Manuals.

We have recently found that the below procedure is more intuitive for the NavNet Installer or Customer who is not yet familiar with all aspects of the NavNet System.

STEP 1: Make sure that **ALL Simulation Modes** have been turned off and these modes are set to “LIVE”! There is a small Simulator Icon



on the left side

of NavNet Displays indicating one or more of the simulator modes are enabled. This small icon can be easily overlooked when installing a NavNet Display!

STEP 2: Install, test, and configure all NavNet Radar Display & Antenna systems **INDIVIDUALLY!** Do this **BEFORE** any network connections or changes are made.

NavNet products allow for multiple radar systems to be connected in a single network. It is important that you confirm each individual radar is operational and adjusted properly before the network connections and settings are made.

-Refer to the RADAR SETUP Section of the Installation Manual for further instruction

-If you are not installing a NavNet Radar as part of your NavNet system, proceed to the next step.

STEP 3: Install, test and configure individual GPS, DGPS, WAAS, LORAN and Heading Sensor inputs **BEFORE** any network connections or changes are made.

NavNet allows for one or multiple NMEA0183 navigation position sensors in a single network. Each NavNet display in a network can be programmed to use its own navigation sensor or get position information from another display on the network.

-Refer to **SECTION 6** in this document for a step-by-step configuration procedure

STEP 4: After the above steps have been completed, the Network Software and Hardware Setup should be performed.

NOTE: DO NOT change any information on the **NETWORK SOUNDER SETUP** display page! The Network Sounder Settings are pre-configured to “Plug & Play” with the Network Sounder (BBFF1). Other default network settings may or may not need modification depending on the configuration of the specific NavNet System.

-Refer to **SECTION 5** in this document for a step-by-step configuration procedure

Section 5 - Network Settings for Multiple Display NavNets

Since NavNet products use ethernet 10Base-T networking protocol, each unit works as a "Node" in the NavNet network. When two or more NavNet components (Including The Network Sounder) are networked together, the IP Address, Host Name, etc must all be coordinated for each unit in the network. This information should only need to be registered once for the life of the product.

(Note: to access this menu, you must be in the "Installation Mode." To get to the menu below, hold down the MENU button while powering up the display, then press MENU, SYSTEM CONFIGURATION, INSTALLATION SETUP, NETWORK CONFIGURATION.)

The screenshot shows the following configuration values:

- IP ADDRESS: 172.031.003.002
- HOST NAME: B
- RADAR SOURCE: A
- CHART SOURCE: A
- SOUNDER SOURCE: SOUNDER
- SUBNET MASK: 255.255.000.000
- GATEWAY ADDRESS: 000.000.000.000
- OFFSET PORT NUMBER: 10000

IP ADDRESS: The important thing about this number is that the last three digits must be different from any other display in the NavNet network. Usually, this number only has to be changed if there are identical displays in the network.

HOST NAME – This is the name of the display as it is recognized by other displays in the network. It may be labeled with up to 8 numbers or alpha characters. For example, in a 3 station NavNet, you may label the displays "A," "B," and "C."

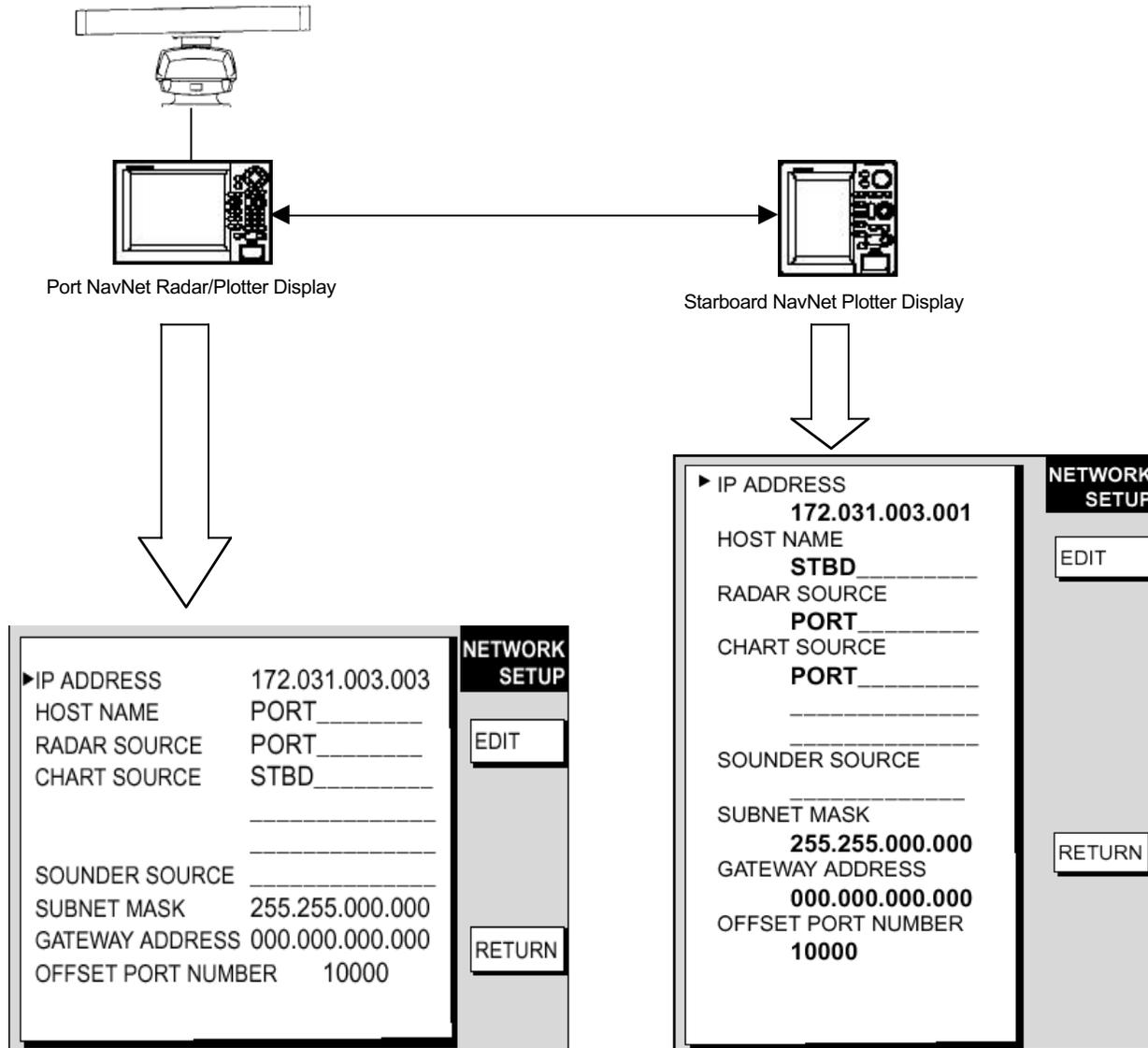
RADAR SOURCE: This entry must contain the host name of a radar display. The "A" selection in this example means that this display is set as a plotter and it is getting its radar information from radar host "A".
If the NavNet Display is a radar display, the HOST NAME and the RADAR SOURCE must match (i.e. "A" & "A" for the radar display in this network). If there is no radar in the network, it should be blanked.

CHART SOURCE: Each NavNet display has a chart card slot. In order for one display find chart information on another networked display, the Host Name of the other displays must be entered here. **DO NOT enter this display's own host name as a Chart Source, it is automatic.**

SOUNDER SOURCE: If a Network Sounder (BBFF1) is connected via the network, "SOUNDER" should be entered here. If a Network Sounder is not connected, it should be blanked.

SUBNET MASK / GATEWAY ADDRESS / OFFSET PORT NUMBER
These are reserved for future Internet use. Do not change them.

The diagram below shows a properly configured dual station NavNet system. Note that either display will be able to use both its own chart card slot, and the chart card in the other display's chart card slot.¹ Both displays are configured to show the radar picture coming from the PORT RADAR.

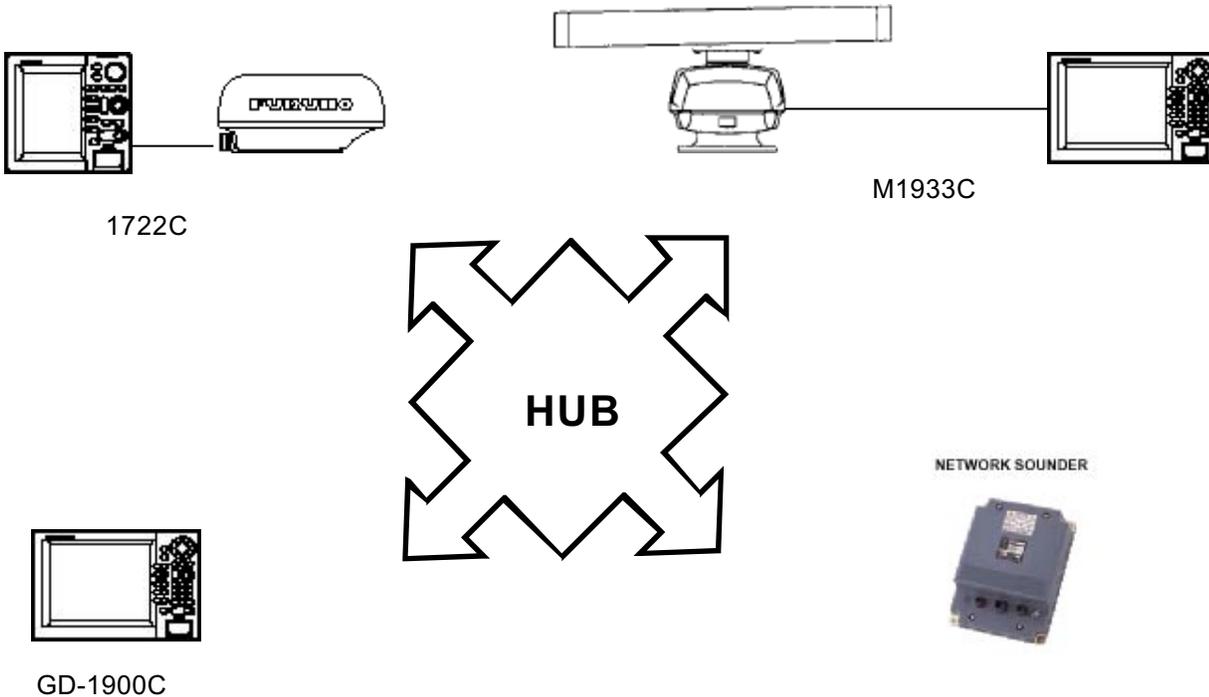


¹C-MAP, FURUNO and Navionics Chart information may be distributed through the network, but you must have a C-map display to view C-MAP cartography, and a Navionics display to view Navionics cartography.

In the sample NavNet Network below, there are 3 displays and a network sounder. Note that the RADAR SOURCE of the GD-1900C may be set to either the 1722C or the M1933C, but not both.

NETWORK SETUP	
▶ IP ADDRESS	172.031.003.001
HOST NAME	A
RADAR SOURCE	A
CHART SOURCE	B
	C
SOUNDER SOURCE	SOUNDER
SUBNET MASK	255.255.000.000
GATEWAY ADDRESS	000.000.000.000
OFFSET PORT NUMBER	10000
RETURN	

NETWORK SETUP	
▶ IP ADDRESS	172.031.003.003
HOST NAME	B
RADAR SOURCE	B
CHART SOURCE	A
	C
SOUNDER SOURCE	SOUNDER
SUBNET MASK	255.255.000.000
GATEWAY ADDRESS	000.000.000.000
OFFSET PORT NUMBER	10000
RETURN	



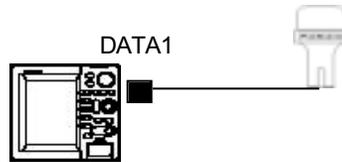
NETWORK SETUP	
▶ IP ADDRESS	172.031.003.002
HOST NAME	C
RADAR SOURCE	B
CHART SOURCE	A
	B
SOUNDER SOURCE	SOUNDER
SUBNET MASK	255.255.000.000
GATEWAY ADDRESS	000.000.000.000
OFFSET PORT NUMBER	10000
RETURN	

INSTALL SETUP	
NETWORK SETUP	
RADAR SETUP	
NETWORK SOUNDER SETUP*	

DON'T ALTER "NETWORK SOUNDER SETUP"! One Network Sounder will "Plug & Play" in any NavNet.

Section 6 - Pos. Sources, GP36 “SENSOR MODE”, Heading and Smart Sensor Integration

A. Connecting the Furuno GP310 BBGPS - The NavNet displays need an external GPS NMEA 0183 input for position source information. When the GP-310 is utilized, displaying position information is as simple as plugging your GP-310’s standard supply cable into DATA PORT 1 on any NavNet display. Once the NMEA 0183 position information is sent into any NavNet display, it will then be transmitted throughout the NavNet network via ethernet.



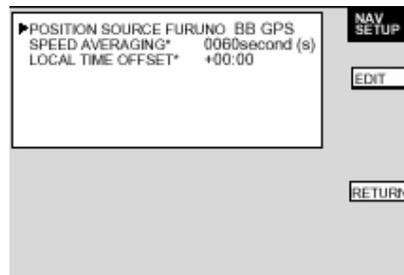
If you are using a GP-310B BBGPS and it is plugged into port 1, your NAV ports need to be changed from the default configuration. Configure your display as follows:

Step 1 - On the display that is connected to the GP-310B, press the SYSTEM CONFIGURATION, SYSTEM SETUP and PORT SETUP and DATA 1: GPS/NMEA PORT soft keys.

Step 2 - Move the cursor to FURUNO GPS SENSOR, then press the EDIT soft key and select YES with the cursor control.



Step 3 - Hit the RETURN soft key three times, and then press NAV OPTIONS and NAV SOURCE SETTINGS soft keys. You should then see the menu below.



Step 4 - Edit the position source to FURUNO BBGPS using the EDIT soft key and the cursor control. Once the above procedure has been completed, the BBGPS should begin to feed position information into the first display.

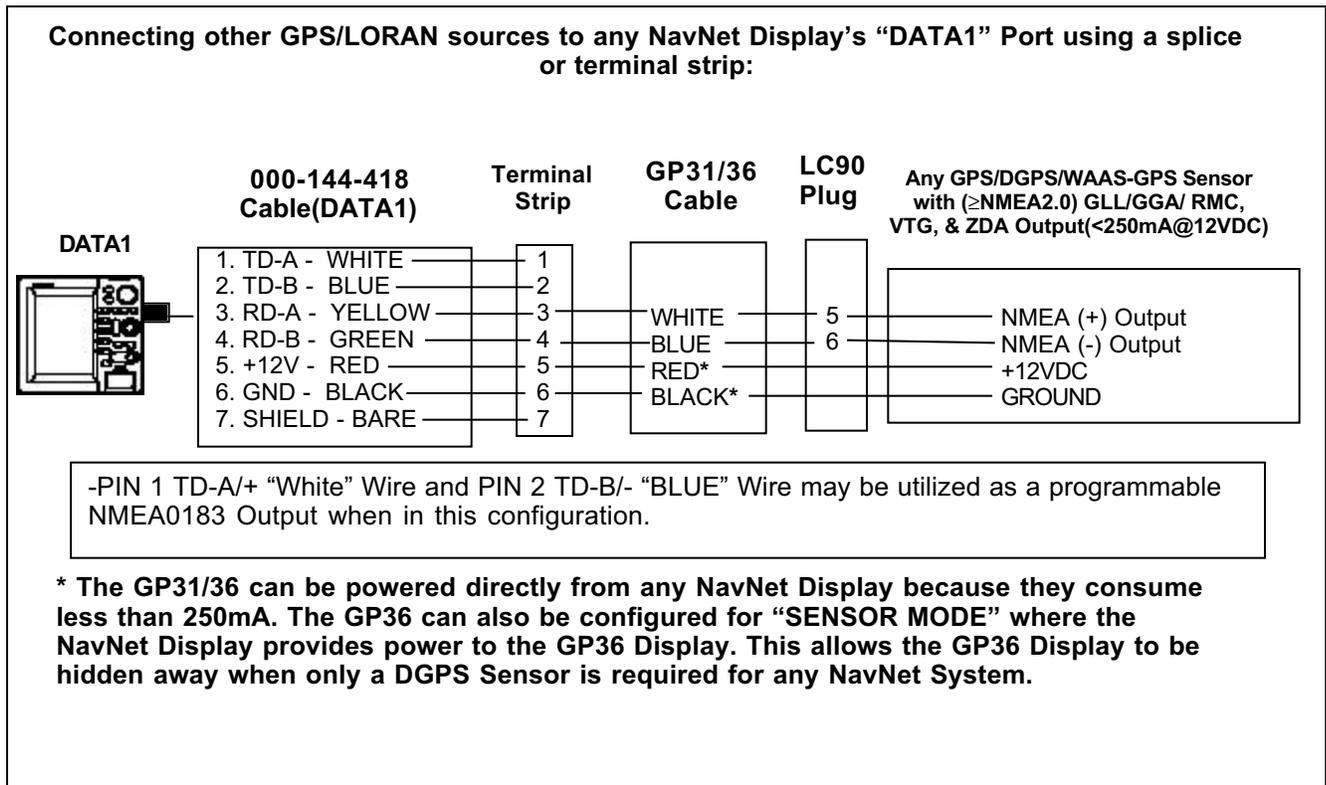
B. Connecting Other Position Sources - You may opt to use a position information source other than the BBGPS GP-310 to provide NMEA position information to your NavNet display / network. Once NMEA data has been input into any NavNet display, the display can then be programmed to distribute this information to all of the other NavNet displays via Ethernet.

The GP-36 may be used to provide DGPS corrected NMEA 0183 data, or you may want to use another manufacturer's DGPS or WAAS GPS as a simple sensor. In many cases, power may be supplied from the NavNet display. The default software configuration of every NavNet Display should allow any position source to be input to the DATA1 Port, except for the Furuno GP310B(BBGPS). To confirm that the software is configured properly, follow STEP 3 and STEP 4 from the previous section and set the POSITION SOURCE to the "ALL" Selection.

WARNING! IF SUPPLYING POWER TO AN EXTERNAL NAVIGATOR FROM A NAVNET DISPLAY, CURRENT DRAW MUST NOT EXCEED 250MA. Refer to both the applicable NavNet installation manual and the GPS manufacturer's installation manual for connection information.

Wiring Configuration Examples Using Furuno 7-Pin Pig Tail Cable Assembly (P/N 000-144-418):

000-144-418 NMEA In/RS232C Out/Buz. Out/12VDC Out Cable List Price \$55.00



C. GP36 “Sensor Mode” – When the installation requires a DGPS Sensor it is possible to make a small hardware modification to the GP36 Display to allow a NavNet Display to provide power to the GP36. This modification locks the GP36 power switch “On”.

In Sensor Mode, the GP36 Display never needs to be accessed and it can be treated as a DGPS Sensor only. The GP36 Display should be considered as a “Black Box Sensor”.

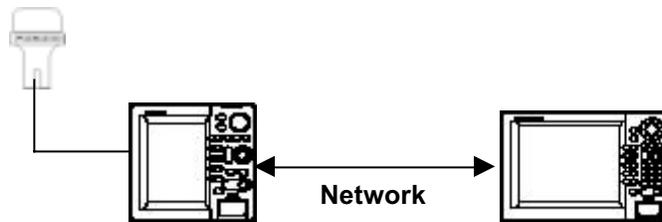
-For further information on this modification contact the Furuno Technical Department.

-Furuno USA will modify any GP36 to Sensor Mode “Free of Charge” when any FUSA Dealer specifies “SENSOR MODE” operation for a GP36 order. Please provide this request to the FUSA Camas/Denton Order Service Departments.

NOTE: Please turn the backlighting illumination to the “OFF” position on the Sensor Mode GP36 when the display is hidden away and not viewed.

-The GP36 may also be powered from a breaker in Sensor Mode for added redundancy.

D. SENDING POSITION INFORMATION TO MULTIPLE DISPLAYS



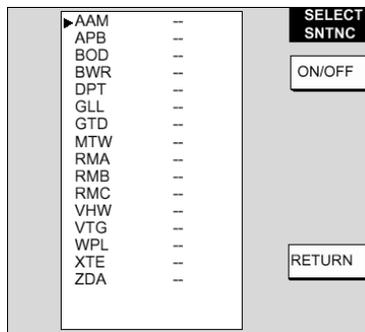
If you have a multiple station system with one BBGPS and you want to transmit the NMEA data from the first display to all of the other displays in the NavNet network, complete the following procedure:

- **Configuration Procedure For The NavNet Display That Is Directly Connected To A BBGPS Or Other Position Source:**

Step 1 - Press MENU, then press SYSTEM CONFIGURATION, SYSTEM SETUP, PORT SETUP, OUTPUT THROUGH NETWORK.

Step 2 - Use the ON/OFF soft key and the up down arrows to select which sentences will be sent out through the network.

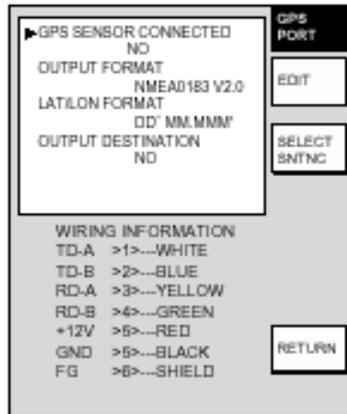
Turn on **ONLY** the following Strings:
GGA, VTG & ZDA
 Do not turn on strings that are not needed.
 The other strings may be utilized in the future.



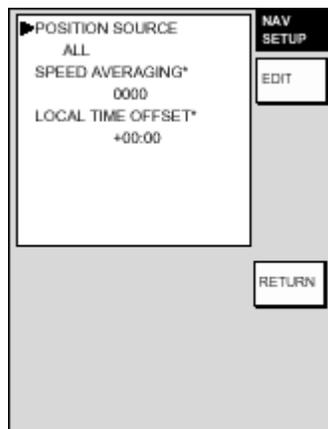
- **Configuration Procedure For All Other Displays In The NavNet That Will Utilize a Position Source Connected To Another NavNet Display:**

Step 1 - press the SYSTEM CONFIGURATION, SYSTEM SETUP and PORT SETUP and DATA 1: GPS/NMEA PORT soft keys.

Step 2 - Move your cursor to FURUNO GPS SENSOR, then press the edit soft key and select NO with the cursor control.



Step 3 - Hit the RETURN soft key three times, and then press NAV OPTIONS and NAV SOURCE SETTINGS soft keys. You should then see the menu below.



Step 4 – Ensure that the POSITION SOURCE is set to ALL by using the cursor control and EDIT soft key.

You should now be able to see the position on all displays connected in the NavNet network.

E. HEADING INFORMATION

Heading information may be connected to any NavNet display. The NavNet displays will accept both AD-10 FURUNO heading data, or NMEA 0183 HDM or HDG sentence. The NavNet display will automatically detect the presence of heading and send it to every other display in the network. There are no menu settings that need to be changed to make this happen. Please note the following:

- Only one heading input to one Radar Display per network is needed.
- The heading information **MUST** be input to the RADAR display in a multiple display configuration.
- Heading may be accepted as an NMEA 0183 signal, but NavNet displays are not capable of repeating NMEA0183 heading information out to other equipment via the NMEA 0183 port.
- **AD10 HEADING FORMAT IS MANDATORY for ARP11 INSTALLATIONS.**

F. SMART SENSOR CONFIGURATIONS

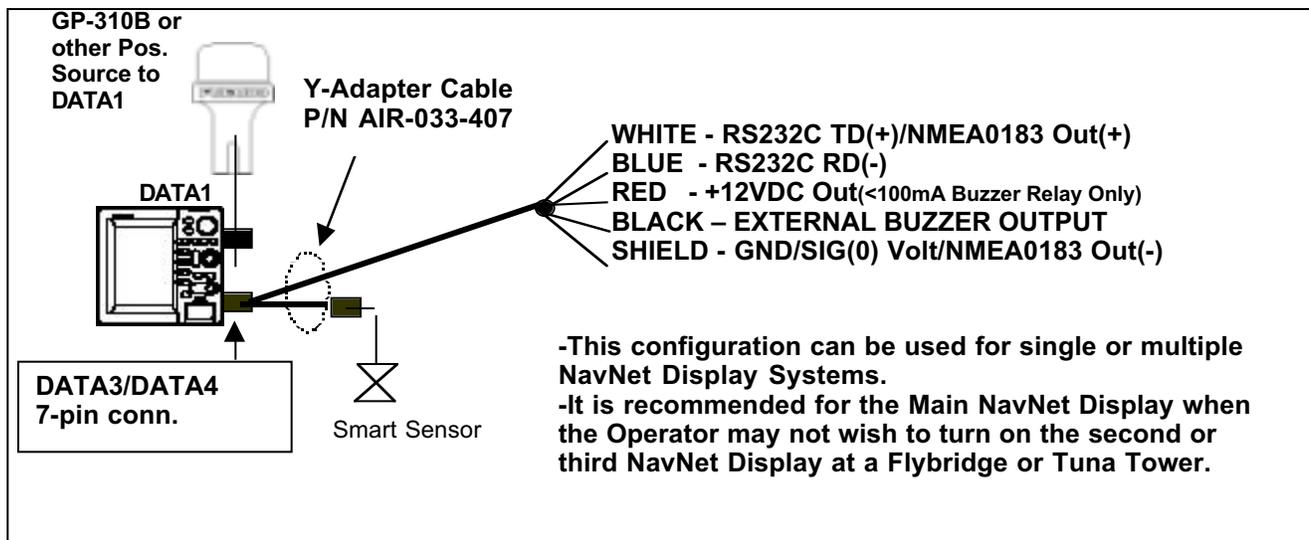
The Furuno Smart Sensor provides digital depth, water temperature, and water speed(Transom Mount Only) data to a NavNet or RD30 Display in NMEA0183 format. A Smart Sensor may be plugged in directly to the DATA1 port on any NavNet display. If the DATA1 port is occupied by the GP-310B, you can use a Y-Adapter Cable, AIR-033-407 or a terminal strip to connect the Smart Sensor to any NavNet Display's 7-Pin Buz/RS232/12VDC/NMEA In Port.

A variety of Smart Sensor installations are possible for Cruising and Fishing vessels with or without the Network Sounder. Several installation examples are provided below:

Smart Sensor Installation Example #1 – Y-Adapter Configuration to DATA3/DATA4

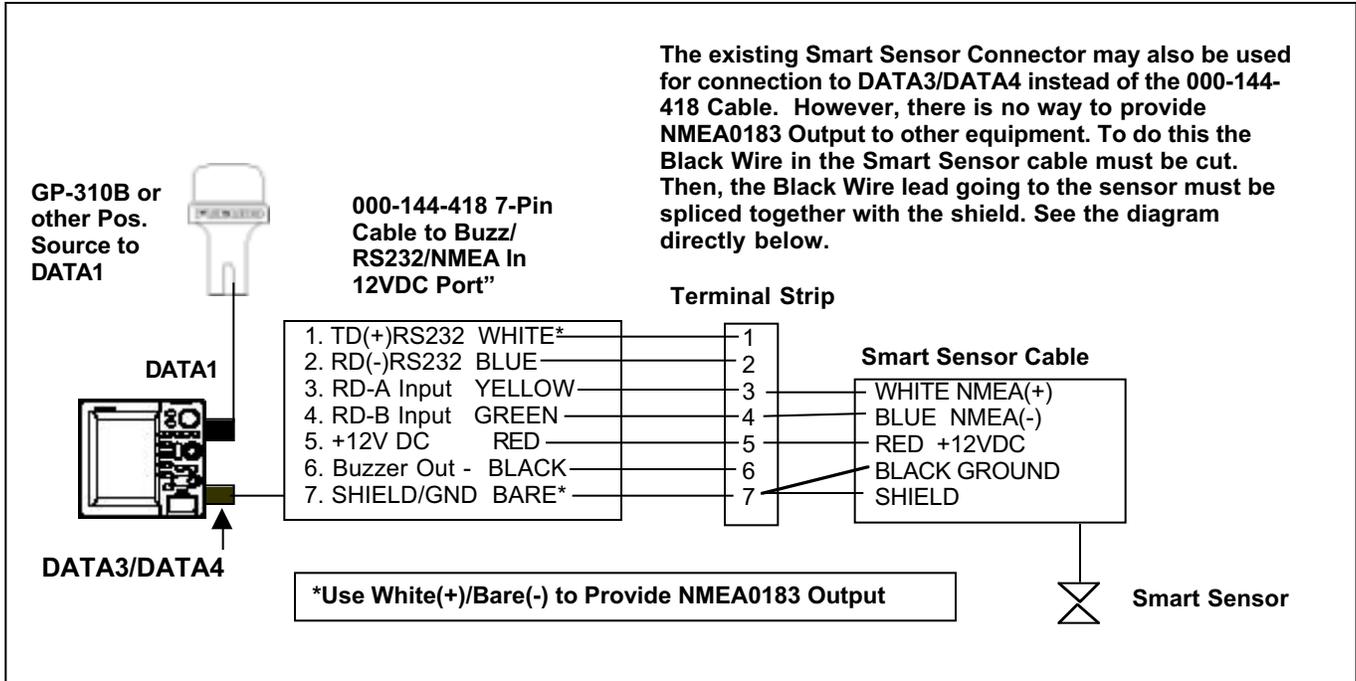
Use the Y-Adapter Cable to plug the Smart Sensor directly into the DATA3 or DATA4(10.4"LCD) on any NavNet Display. The Y-Adapter's Pig Tail also provides NMEA0183 Output to an autopilot, VHF DSC, or PC.

AIR-033-407 Y-Adapter Smart Sensor to NavNet Display List Price = \$TBA

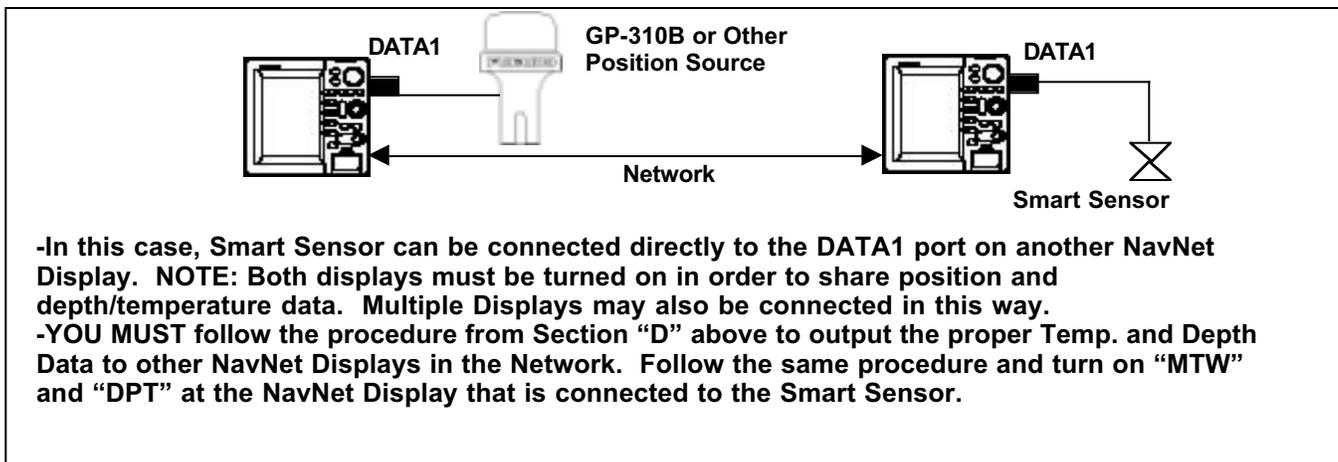


Smart Sensor Installation Example #2 – Modifying or Cutting the Smart Sensor Cable for Connection to DATA3/DATA4

This method utilizes the existing Smart Sensor 7 pin connector or a 000-144-418 cable to allow connection to the DATA3/DATA4 7 pin connector.



Smart Sensor Installation Example #3 – Multiple NavNet Display Configuration Using DATA1 Connections

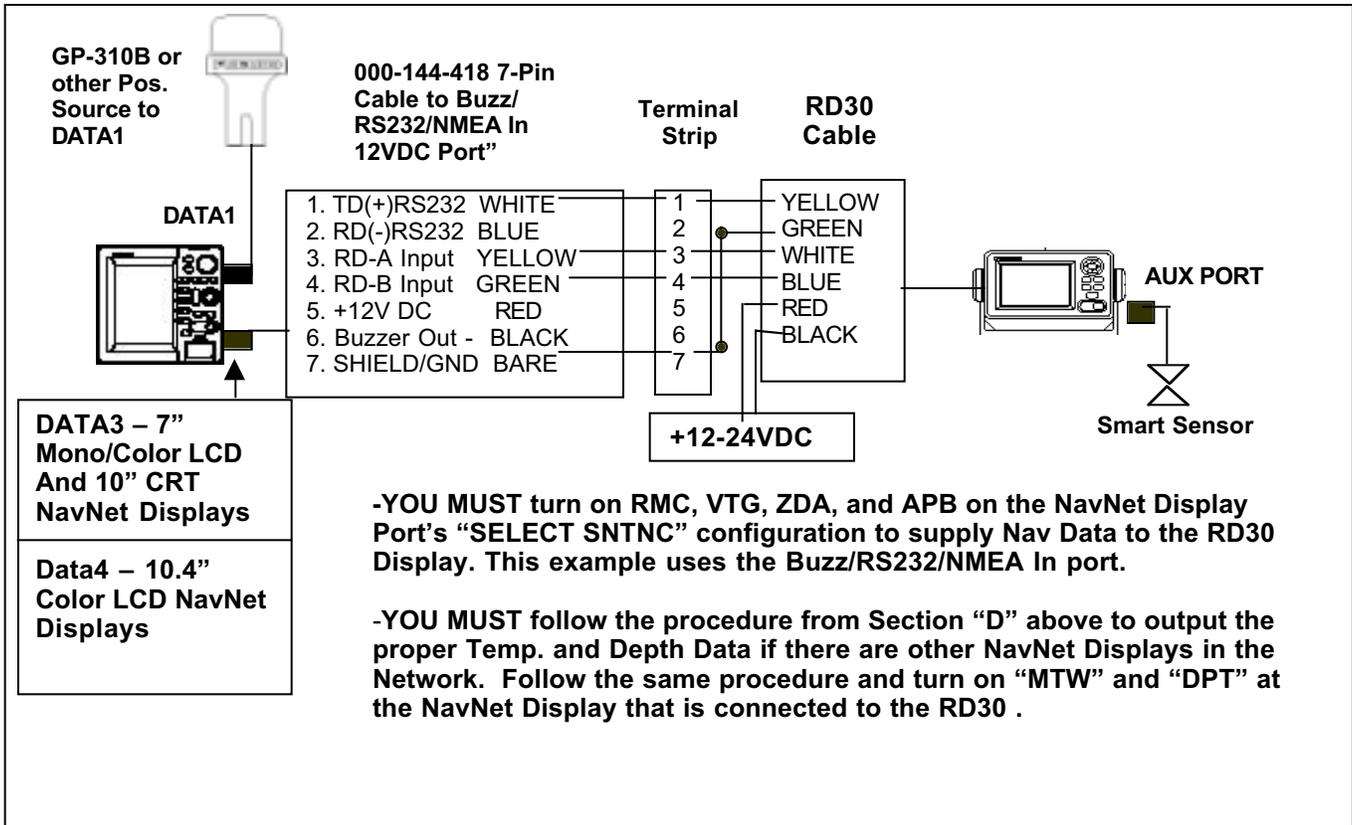


Smart Sensor Installation Example #4 – NavNet Display(s) with RD30 Using DATA3/DATA4 Connections

Using the RD30 directly connected to the Smart Sensor provides a “Stand-Alone” Digital Depth/Temperature/Water Speed(TM Only) Indicator and a secondary multifunction display.

-Additional RD30 Displays may be added to each NavNet Display and the NMEA0183 Data to additional RD30s can either be taken from the RD30 output or from an NMEA0183 Port on any NavNet Display.

-Use the White/Shield NMEA0183 Output to send data to an Autopilot, VHF DSC, etc.



G. NETWORK SOUNDER(BBFF1) AND SMART SENSOR SOFTWARE CONFIGURATION

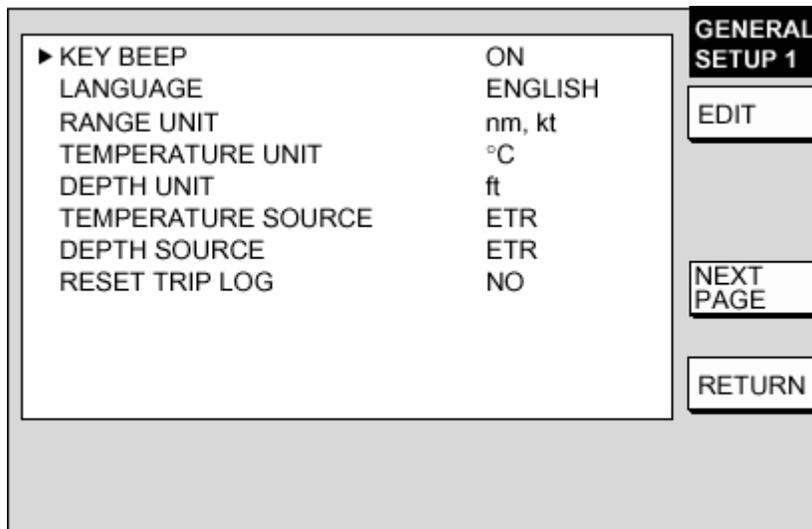
Any NavNet Display can have a Network Sounder (BBFF1) and also receive Smart Sensor digital depth and temperature information simultaneously. However, you must select the “Source” of the digital depth and temperature information that will be shown on each individual NavNet Display in a network.

For Example, if the customer prefers to navigate in shallow water by using the Smart Sensor Depth info, the NavNet Display should be set for “NMEA” as the Digital Depth Source. If the installation does not have a Smart Sensor, the Network Sounder needs to be utilized as the Digital Depth and Temperature Source. This should be changed by setting the Depth and Temperature Sources to “ETR” in the General Setup Menu.

NOTE: The NavNet Display’s Depth and Temperature Alarm Parameters will always utilize the source of digital depth and temperature selected in the “General Setup 1” menu. This allows a Cruising Customer to have Depth/Temp indications and alarm capabilities from an NMEA Source or Smart Sensor without requiring a Network Sounder (BBFF1).

Procedure to select the depth and temp sources:

Step 1 -Press the MENU button, then press SYSTEM CONFIGURATION followed by GENERAL SETUP. You will see the menu shown below.



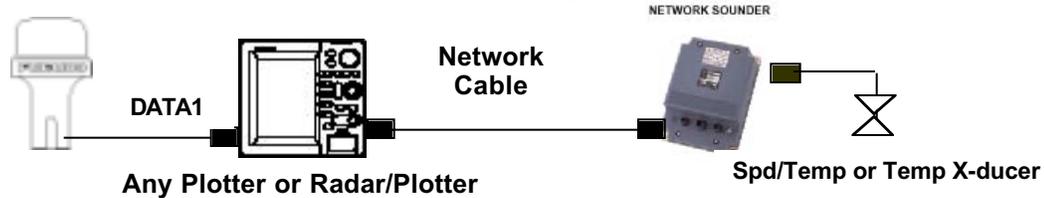
Step 2 - If you want your DEPTH and TEMP information to come from the AIRMAR smart sensor, select NMEA for TEMP SOURCE and DEPTH SOURCE.

Step 3 - If you want your DEPTH and TEMP information to come from the ETR, select ETR for TEMP SOURCE and DEPTH SOURCE.

Step 4 - Once you have selected your DEPTH and TEMP source, you may distribute this information throughout the network.

AP- 1 – “QUICK SOFTWARE SETUP” – Basic Software Settings For Single Display NavNet Configurations

Configuration #1 – One NavNet Display + BBFF1 + BBGPS



ATTENTION!

- Make Sure All Simulation Modes are set to “LIVE” – You should NOT see a small “SIM” box anywhere on the display
- Don't Change Any NETWORK SETUP or NETWORK SOUNDER SETUP settings in the INSTALLATION SETUP menu – None are required for a single NavNet display system!

(STEP 1 is Required for Radar/Plotter Displays ONLY – FOR Plotter Displays, GO to STEP 2)

STEP 1 - Configure the Initial Radar Parameters in the Installation Mode

- Entering INSTALLATION MODE – With Display turned off, hold down MENU while pressing Power momentarily to turn display on. Continue holding Menu Key for 10 Sec.
- Keystroke Sequence – MENU > SYSTEM CONFIGURATION > INSTALLATION SETUP > RADAR SETUP – Configure EACH parameter in the list of initial radar settings. Note that some settings are found by pressing the “Next Page” softkey – Refer to the Installation Manual for details.
- When finished configuring the radar settings, turn the display off, then on again to escape from the INSTALLATION MODE.

STEP 2 – Change Nav Position Source to BBGPS –

- Keystroke Sequence #1 – Program DATA1 Port for BBGPS:
MENU > SYSTEM CONFIGURATION > SYSTEM SETUP > PORT SETUP > GPS/NMEA PORT – highlight “Furuno GPS Sensor” > EDIT – highlight “YES” > ENTER > MENU – return to normal mode
- Keystroke Sequence #2 – Program Navigation Source for BBGPS:
MENU > SYSTEM CONFIGURATION > NAV OPTION > NAV SOURCE SETTINGS – highlight “Position Source” > EDIT – Select “FURUNO BB GPS” > ENTER > MENU – return to normal mode

STEP 3 – Configure Digital Depth and Temp Display for BBFF1

- Keystroke Sequence – MENU > SYSTEM CONFIGURATION > GENERAL SETUP – highlight “TEMPERATURE SOURCE” > EDIT – select “ETR” > ENTER – Select “DEPTH SOURCE” > EDIT – select “ETR” > ENTER > MENU – return to normal mode

Configuration #2 – NavNet Display + BBFF1 + Any GPS Source

Completely Remove STEP 2 from the above procedure. Follow Step 1 and Step 3 to complete the basic installation process.
NMEA/GPS Port and Position Source configuration is only required when the BBGPS is utilized.