Installing an NMEA 2000® Network

Installing an NMEA 2000® network consists of interconnecting NMEA 2000® electronic devices using plug-and-play cables and connectors. The following pages provide a brief description of how to set up an NMEA 2000® network using five basic steps:

1. Cable and Connector Network Basics
2. Installing Terminators
3. Supplying Power
4. Grounding the Network
5. Checking the Network

Please note that this installation guide contains a brief description of the basic concepts of installing an NMEA 2000® network and Maretron suggests that you consult a trained professional for any installation. You can learn more about installing NMEA 2000® networks by contacting the National Marine Electronics Association (NMEA) at www.nmea.org and consulting the following documents:

- NMEA 2000® Standard for Serial-Data Networking of Marine Electronic Devices
- NMEA Installation Standards

1. Cable and Connector Network Basics

1.1 Network Topology

The NMEA 2000® cable system uses a trunk (sometimes referred to as the backbone) and drop line topology as shown in Figure 1.

The NMEA 2000® cable system includes five wires within a single waterproof cable: two signal wires, power and ground wires, and a drain wire. The drain wire shields the signal, power, and ground wires from external Radio Frequency Interference (RFI) and helps to reduce RFI emission from the cable.

You can connect devices using one of two cable options:

- **Mini** - This is commonly used for the trunk line on the network because of its greater current carrying capacity (4 amps) as opposed to Micro cable (4 amps). Mini cable has an outside diameter in the range from 0.41 to 0.49 inches. Its maximum installed bend radius is 7x the cable diameter. You can also use this type of cable for drop lines.

- **Micro** - This cable type is typically used as the drop line connecting devices to the main trunk line with an outside diameter in the range from 0.24 to 0.28 inches. Micro cable has a smaller diameter and is more flexible than mini cable with an installation bend radius of 7x the cable diameter. Smaller networks use this type of cable for both the trunk and drop lines.

You construct the trunk line using double-ended cordsets (page 6 and 14) connected between tees or taps (page 4 and 12). One end of the cordset has a male connector with male pins while the other end of the cordset has a female connector and female receptacles. The connectors are keyed so they can only connect to each other in one way. As an alternative to double-ended cordsets, you can make your own trunk line using bulk cable (page 1 and 9) and field-attachable connectors (page 2 and 10). If you decide to add equipment later, you can simply disconnect a cordset from a tee, add another tee directly to the existing tee, re-connect the cordset and add the new component to the system using a drop cable. Alternatively, you could cut the trunk line, add two field-attachable connectors and insert a new tee. Trunk lines can also be run up to watertight bulkheads and connected to a waterproof bulkhead feed-thru connector (page 3 and 11) to maintain the integrity of watertight compartments.

To disconnect a cordset from the trunk line, you need a tool to remove the connector and female receptacles. This tool allows you to remove a device for servicing while the rest of the network remains operational. Multi port boxes (page 7) are also available where instruments tend to be clustered, around the helm for example.

1.2 Maximum Cable Distance

The cable distance between any two points in the cable system must not exceed 200 meters (656 feet) for the Mini cable or 100 meters (328 feet) for the Micro cable.

For most cases, the maximum distance should be measured between termination resistors. However, if the distance from a trunk line tee to the farthest device connected to the trunk line is greater than the distance from the tee to the nearest terminating resistor (TR), then you must include the drop line length as part of the cable length in your maximum cable distance calculation. Figure 2 shows an example where both 5 meter drops must be included in the maximum cable distance since the drops are longer than the distance from the tee to termination resistor.

![Figure 1 - NMEA 2000® Network Topology](image1)

![Figure 2 - Maximum Cable Length Determination](image2)