



OPTIMUS 360 JOYSTICK CONTROL SYSTEM



EN Joystick Control System for Engines with Integrated Electronic Shift and Throttle

Installation Manual — Book 63

WARNING

Cancer and Reproductive Harm
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Thank you for choosing the Optimus™ 360 Joystick Control System. You have chosen a state of the art steering system that will provide years of effortless and trouble free steering performance.

About this Book

This book contains:

- instructions required to install and calibrate the Optimus 360 Joystick Control System for electronic shift and throttle engines.

This document is to be utilized in conjunction with the Optimus Hydraulic EPS Installation Manual (PID #682158), Optimus Electric EPS Installation Manual Book 54 (PID #682220), and Book 65 (PID #682170). These books contain installation, calibration, and purging instructions for the base electronic steering system, upon which the joystick control system is built.

This book must be delivered to the owner when installation is complete.

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Proposition 65 Warning

Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer and reproductive harm.

Wash hands after handling.

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Abbreviations

The following abbreviations are used in this manual:

ABYC	American Boat & Yacht Council
AUX	Auxiliary
BAT	Battery
BCM	Boat Control Module (Suzuki)
CAN	Controller Area Network
CAN bus	Controller Area Network (data) bus. (A harness of wires that carry digital signals and power between electronic modules)
CL/CLP	Command Link/Command Link Plus (Yamaha)
DC	Direct current
DEC	Digital Electronic Control (Yamaha)
ECM	Engine control module
ENG	Engine
EPS	Electronic Power Steering
EST	Electronic shift and throttle
FT-LB	Foot-pounds, a US unit of torque
FWD	Forward
GND	Ground
HI	High
IN-LB	Inch-pounds, a US unit of torque
LED	Light emitting diode
LO	Low
LPS	Lever position sensor
MPH	Miles per hour
NA	Not applicable or Not available
N/C	No connection
Nm	Newton-meters, a metric measure of torque
NMEA	National Marine Electronics Association
NMEA 2000®	A protocol for digital communication on a CAN Bus
OEM	Original equipment manufacturer
PCM	Pump control module
REV	Reverse
ROT	Rotation mode (joystick control)
RPM	Revolutions per minute
SIDE	Sideways mode (joystick control)
STBD	Starboard (right when facing forward)
SW	Switch
WOT	Wide open throttle



NOTE

Some abbreviations not listed here may be found in their respective sections.

1 Important Safety Information

Safe operation of the Optimus™ 360 Joystick Control System depends on proper installation and maintenance of the system, as well as the operator's safe judgment, boating knowledge, and expertise.

The installer and operator must read and understand the safety requirements in this section before installing or using the steering system. If you have any questions about safe installation or operation of this system, contact Dometic Marine. Please don't guess.

1.1 Explanation of symbols

The symbols below are used throughout this publication to alert you to potential hazards involved with the operation and installation of this product. Observe these warnings and notices carefully. The safety alerts alone cannot eliminate hazards; strict compliance with any special instructions during installation, operation, and maintenance, along with common sense operation, are important measures to prevent hazardous situations.



DANGER!

Safety instruction: Indicates a hazardous situation that, if not avoided, will result in death or serious injury.



WARNING!

Safety instruction: Indicates a hazardous situation that, if not avoided, could result in death or serious injury.



CAUTION!

Safety instruction: Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.



NOTICE!

Indicates a situation that, if not avoided, can result in property damage.



NOTE

Supplementary information for operating the product.

1.2 Safe operation



WARNING!

The safety information below is intended to inform you of hazards that may be present when operating a boat equipped with Optimus EPS. Read and understand this information.

General

- Read and understand this manual, the Quick Reference Guide, and any other documentation provided with your steering system.
- Know and obey all applicable federal, state, and municipal laws and regulations that govern boating in your area. Dometic recommends all boat operators take a boating safety course.
- Never operate a boat while under the influence of drugs or alcohol.

Before every use

- Perform the system inspection as described in Book 50.1 or Book 54.
- Make sure your Quick Reference Guide and/or this manual is on your boat. Both contain important safety information that you may need in the event of a system fault while on the water.



WARNING!

Do not operate the boat if any component is not in proper working order. It may result in a loss of steering control, which could lead to a collision and/or ejection from the boat, causing property damage, personal injury, and/or death.



WARNING!

Do not operate your boat without a functioning CANtrak display or a compatible Garmin display integrated with the Optimus system.

During use

- Wear a Coast Guard-approved personal flotation device (PFD).
- Attach the engine shut-off lanyard to your PFD.
- Do not allow anyone not familiar with the controls (steering, shift/throttle) to operate the boat.

After use

- Rinse off the SmartCylinder(s) or Electric Actuator(s) thoroughly, using only fresh, clean water at low pressure. Never use high-pressure water from a hose nozzle or pressure washer.
- Do not use acetone, or cleaners containing ammonia, acids, or any other corrosive ingredients, on any Optimus components.
- Some products formulated for cleaning fiberglass hulls are known to aggressively corrode stainless steel shafts. If using a hull cleaner, avoid overspray on to the Electric Actuators. Rinse off any overspray immediately with fresh, clean water.

1.3 Safety considerations for installers



WARNING!

The Optimus EPS system must be installed by an authorized dealer or OEM boat builder.

Before installation

- Read and understand this manual, and any other manuals supplied with this system.
- Ensure you have all the required components on hand before you start.
- Do not use a wheel-mounted trim switch with coiled cord. The cord can wrap around the steering wheel shaft and inhibit steering.

During installation

- Install components as instructed in this manual. Some component parts and kits may contain additional installation instructions – refer also to those instructions.
- Do not substitute any component of the system. Dometic and Optimus parts are rigorously engineered and tested to ensure system integrity. Substitution of components may compromise safety, performance, and reliability.
- If an instruction is unclear, contradictory, or you are otherwise unsure how to proceed, do not guess. Contact Dometic Marine technical support.

After installation

- Perform the system inspection and interference checks described in Book 50.1 or Book 54.
- Correct any interference issues before handing the boat to the owner.



WARNING!

Failure to comply with these instructions may result in a loss of steering control, which could lead to a collision and/or ejection from the boat, causing property damage, personal injury, and/or death.

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2 System Overview

2.1 System description

The Optimus 360 Joystick Control System builds on the base Optimus Electronic Power Steering (EPS) system. It uses the same helm, PCM, power steering pumps, service valves and smart steering cylinders. It also operates using the same CANbus networks (CAN1, CAN2, and the optional CAN3). It differs from the base Optimus system in that it includes a joystick and advanced control algorithms to enable complete vessel control using the engine manufacturer's Electronic Shift and Throttle (EST) system.

Like the Optimus EPS, the Optimus 360 system can support multiple control stations.

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3 Installation

3.1 Important information/Technical Support contact

To assist with the installation and maintenance of this steering system, Dometic recommends that:

- Installation must be performed by a Dometic authorized installer.
- Read and understand all installation manuals before starting the installation process (cylinders, helms, etc.). Knowing the correct order of installation and location of components will drastically reduce installation time as well as prevent common installation errors.
- Read and understand ALL Safety Information that is noted in this and all other Installation Manuals.

If any problems are found before, during, or after the installation of the steering system, please contact Technical Support for assistance:

Technical Support

Web: www.dometic.com

E-mail: seastar@dometic.com

Phone: 604.248.3858

Fax: 604.279.2202

3.2 Installation overview

Before reading this supplemental, read the Optimus EPS Installation Manual (Book 50.1), Optimus EPS User's Manual (Book 51), Optimus 360 Joystick Control System User's Manual (Book 62), and Optimus EPS Electronic Power Steering with Electric Actuator Installation and User's Manual (Book 54), available at www.optimusportal.com. This will provide a basic working knowledge of the base Optimus EPS and Joystick Control System.

The installation of the Optimus 360 system falls into two parts, component installation and system calibration, purging and setup.

TECH TIP

If you are new to installing an Optimus 360 system it can be helpful to think of the process as adding a joystick to an installed Optimus EPS system. You may find your first installation simpler if you do a complete EPS installation first (i.e. complete the instructions in Book 65, up to and including Sea Trial) before returning to this book and completing the joystick installation.

3.2.1 Part 1 – Component installation

Components may be installed in any order. Table 3-1 shows where the installation information can be found for each component.

Component	Reference Document
Steering Helm	Optimus EPS Installation Manual (Book 50.1) Optimus EPS Electronic Power Steering with Electric Actuator Installation and User's Manual (Book 54)
CANtrak Display	
Hydraulic Pumps	
SmartCylinders	
Steering Service Valves	
System Plumbing	
Base (EPS) System Wiring	
Joystick	This document (Section 3.3)
Control Head (by Yanmar)	This document (Section 10.1)
Control Head (by others)	Refer to engine manufacturer's documentation
360 System Wiring	This document (Sections 3.4, 3.5, and engine manufacturer-specific sections)

Table 3-1. Component list and installation references.

3.2.2 Part 2 – System calibration, purging and setup (Section 4.0)

The system calibration, purging and setup must be done in the correct order as defined in Table 3-2.

Step	Description	Reference Document
1	Initial Setup	This document (Section 4)
2	Purging Steering System	Optimus EPS Installation Manual (Book 65)
3	Calibration	Optimus EPS Installation Manual (Book 50.1) Optimus EPS Electronic Power Steering with Electric Actuator Installation and User's Manual (Book 54)
4	Control Head and Gateway Setup	This document (manufacturer-specific sections 5-8)
5	Sea Trial	Optimus EPS Installation Manual (Book 65)
6	Joystick Setup	This document (Section 9)

Table 3-2. System setup order of operations.

3.3 Installing the Joystick

Install the joystick on the dash in an area that allows convenient, unobstructed access. Whenever possible, mount the joystick on a horizontal surface in a location that will minimize water spray.

Install the joystick using the hardware provided in the kit. The joystick harnesses must be strain relieved to one of the mounting studs using the cable tie provided with the joystick hardware.

A dash cutout template is provided in Appendix A.

3.3.1 Joystick types

There are two types of joysticks: master and additional station. Every installation must have at least one master joystick, which comes factory configured for the number of engines in the installation. The master joystick can be installed at any control station – the joystick type is independent of the joystick station.

If there is no master joystick in the system you will get a persistent “Missing Master Joystick” warning on the CANtrak display. Similarly, if the master joystick type doesn’t match the configured number of engines, the CANtrak will display a persistent “Invalid Joystick Configuration” warning.

Table 3-3 lists the available joysticks at the time of printing.

Joystick Part No.	Description
EJ1400	Joystick, Master, Twin Engine
EJ1403	Joystick, Master, Triple Engine, Tiebar
EJ1404	Joystick, Master, Quad Engine, Tiebar
EJ1401	Joystick, Additional Station

Table 33. Available Joysticks.

3.4 CAN1 Harness connections

For CAN1 harness selection and connections refer to the Optimus EPS Installation Manual (Book 50.1) or Optimus EPS Electronic Power Steering with Electric Actuator Installation and User's Manual (Book 54).

In addition to this, the Optimus 360 system requires a 6-pin CAN1 harness connection between the steering helm and the joystick. Refer to Book 50.1 or Book 54 for proper harness selection and strain relieving.

In particular installations, a CAN1 wye harness (CM21702) or a CAN1 hub (HA5497) may be required to make all necessary connections.

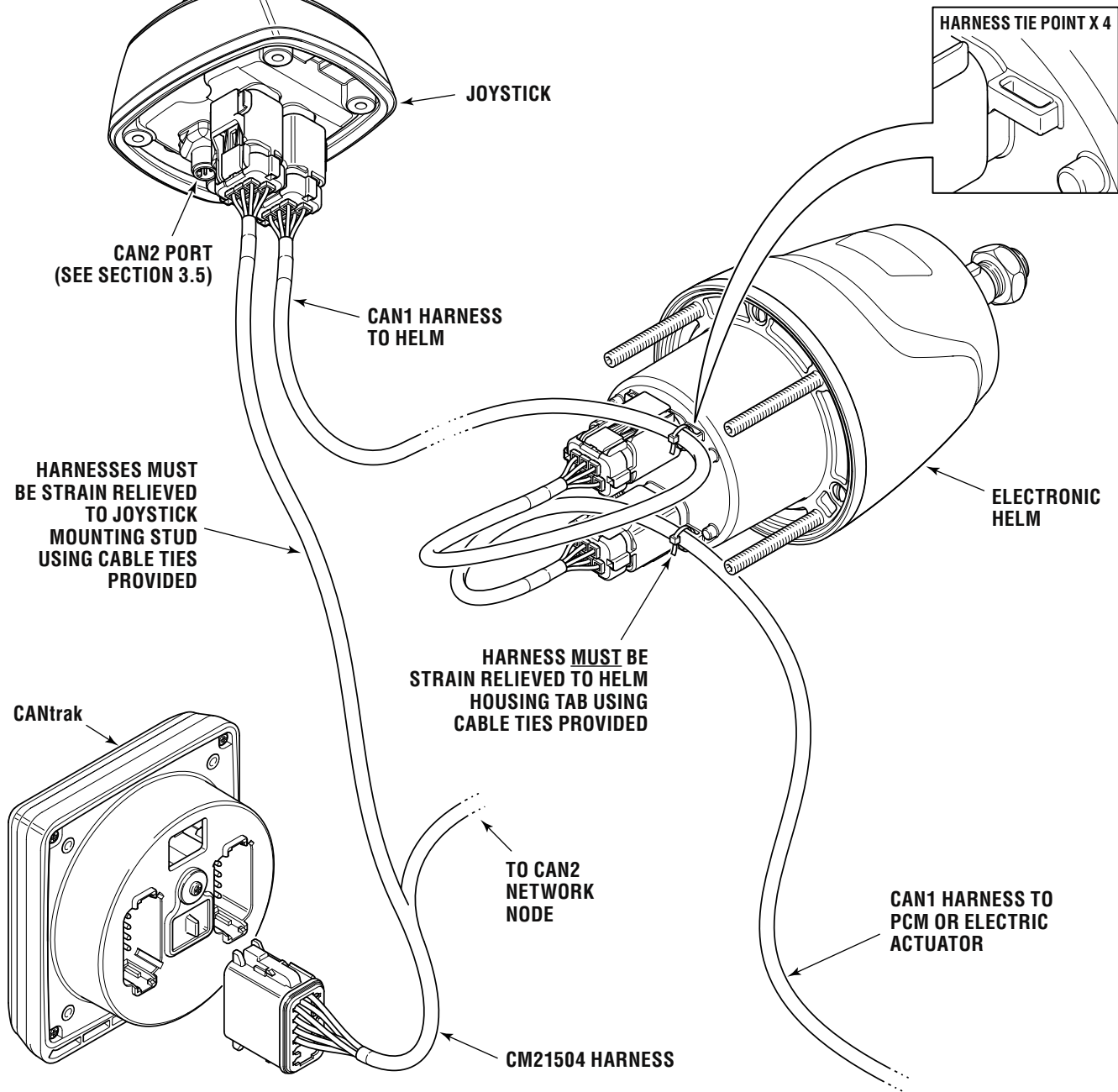


Figure 3-1. CAN1 harness connections.

3.5 CAN2 Harness connections

The Optimus 360 system uses the same CAN2 network, cables and structure as the basic Optimus EPS system. The Optimus 360 system adds a joystick and control head (if applicable) to the CAN2 network.

Figure 3-2 shows a sample CAN2 network diagram. The exact connections will vary depending on the engine manufacturer; consult the OEM-specific sections of this manual for detailed network diagrams. Refer also to Book 50.1 or Book 54 for CAN2 wiring, harness selection, and installation best practices.

All tees must be secured using both screw holes, and the cable drops at each tee must be appropriately secured and strain-relieved to prevent any pull on the tees. See figure 3-3 for proper tee installation. Any unused tees must either be capped or removed.



WARNING!

Failure to secure harness may result in harness wear, causing loss of steering control, property damage, personal injury and/or death.

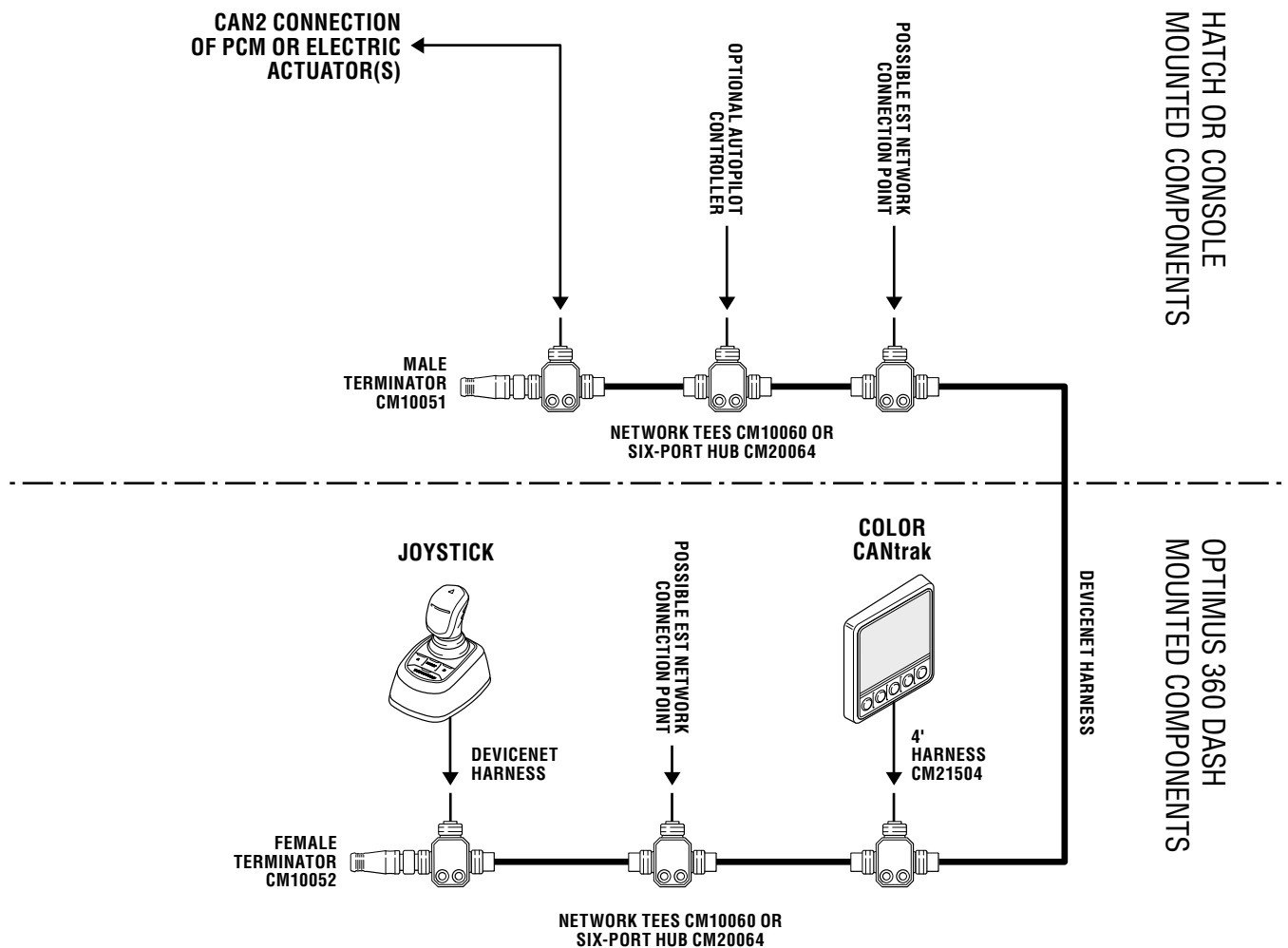


Figure 3-2. Generic CAN2 wiring diagram.



WARNING!

Failure to secure harness may result in harness wear, causing loss of steering control, property damage, personal injury and/or death .

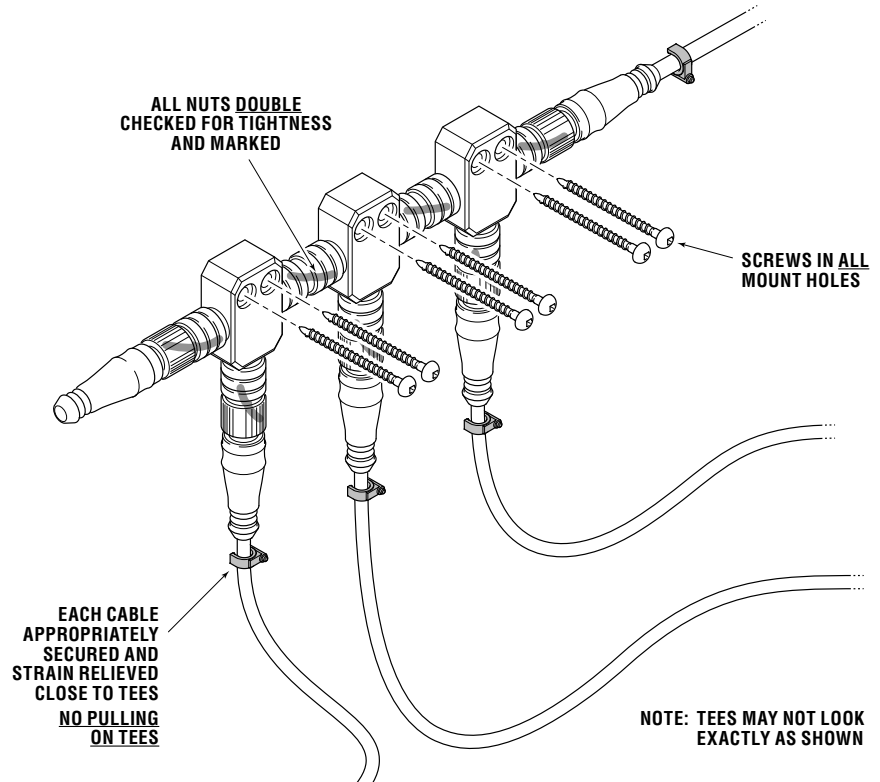


Figure 3-3. Correct CAN2 tee installation example.



CAUTION!

Do not connect anything other than Optimus components, or Dometic approved autopilots, to the CAN2 network.

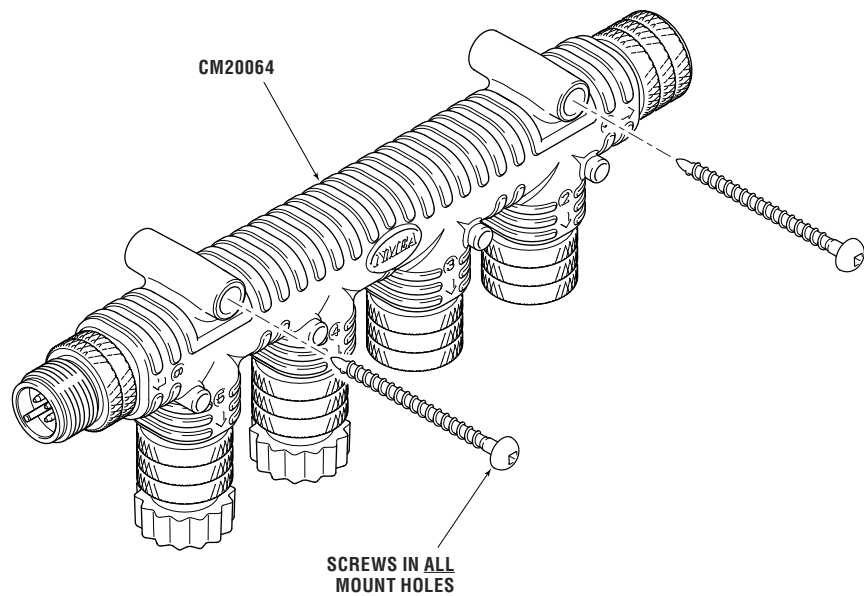


Figure 3-4. Alternative CAN2 6-port hub connection.

4 System Setup, Purge, and Calibration

Before you proceed you need to have all Optimus EPS and Optimus 360 components installed, harnesses connected, and ignition sensing and power wiring completed. If you haven't already done so you'll need to go to the section specific to your engine (section 5 through section 11) for network interconnection diagrams and some engine-specific installation details. Do not do any engine-specific setup or configuration at this time; you will need to perform the initial setup first.

4.1 Initial system setup

The system setup is performed easily with the color CANtrak display. (If you prefer to use Datalink, see Appendix B.) It is designed to walk you through the following tasks:

- Configure the system type
- Choose the number of helms and displays in your system
- Update system software
- Select device locations

You will need access to the CANtrak Dealer Menu for all setup tasks. See section 2.1 in the Optimus EPS Installation Manual (Book 65) for instructions.



NOTICE!

The software update wizard uses the system configuration you set up here to automatically install the correct software revisions for your system. Don't update the software until prompted in the procedure.

Procedure:

1. On the display, navigate to **Dealer Menu > Initial Setup > System** to access the System Setup menu.

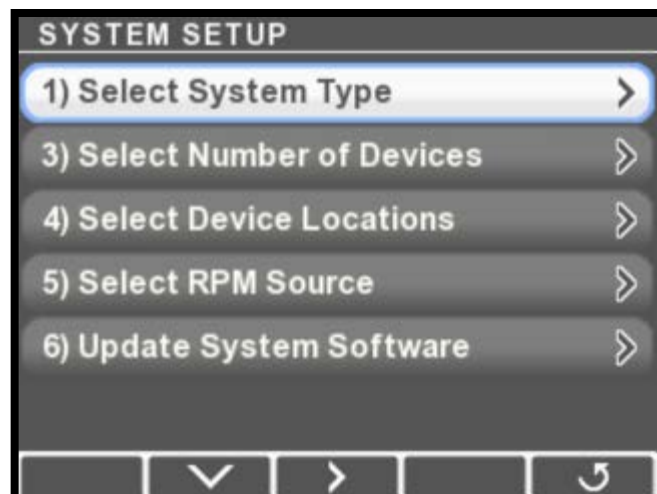


Figure 4-1.

2. Press **>** to enter the Select System Type menu.

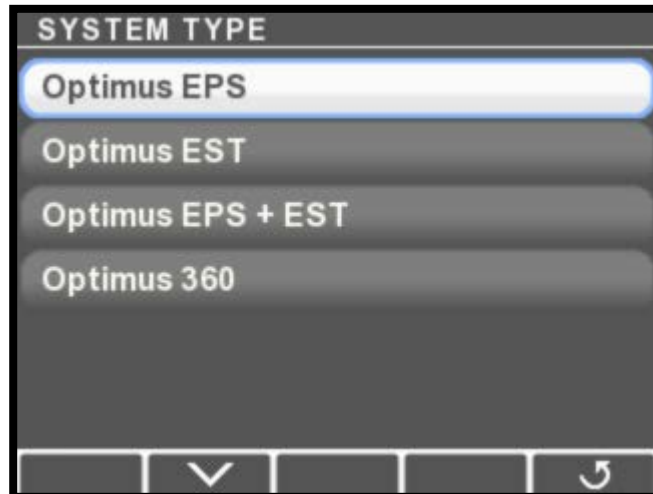


Figure 4-2.

3. Select **Optimus 360** then press **Save** or **↻** to return to the System Setup menu. When you set the system type the CANtrak automatically configures the menus to show only items that relate to your system.
4. Choose Select **Shift & Throttle Type** and press **>**. Choose the appropriate option from the list and press **↻** to return to the previous menu.
5. Choose Select **Number of Devices** and press **>**. The devices you see in this list may not match the figure. The available selections will change based on the system type you specified previously.

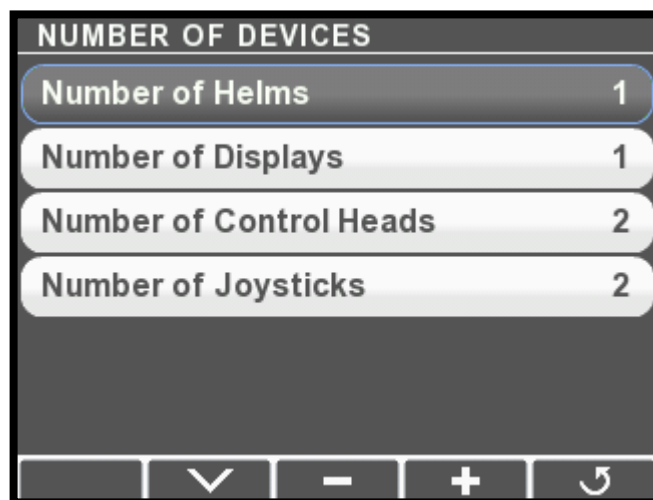


Figure 4-3.

6. Use the **+** and **-** buttons to change the quantity of each device to match your system. Press **Save** or **↻** when finished to return to the System Setup menu.
7. Review section 11.0 in Book 65 and determine if your system software needs to be updated.

8. Multiple helm stations only: choose **Select Device Locations** from the System Setup menu and press ➤. The display will list the installed components along with their serial numbers. Check the serial numbers and use the + and – buttons to toggle the components between Main and Second station. Press Save to return to the System Setup menu.

4.2 Purge and calibrate

You are now ready purge and calibrate your steering system. Refer to the Optimus EPS Installation Manual (Book 65) for instructions. *Be sure to perform the steering installation checks described in Book 65.* The steering portion of the system should now be fully functional.

4.3 Engine-specific setup

Before you are ready to Sea Trial the steering system and set up the joystick, you will need to perform some engine-specific setup activities. You will find these in the section related to the engines you are using.

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5 Evinrude

To complete the system installation for an Evinrude ETEC EST engine you need to:

1. Install the Evinrude control head (refer to installation instructions provided by Evinrude)
2. Complete the CAN network connections (section 5.1)
3. Set up the control head using Datalink (section 5.2)

Once you've completed these steps you can move on to the sea trial (Book 65) and then to the joystick setup (Book 65).



WARNING!

Sealing plugs must be installed on all unused CAN1 ports.

5.1 Evinrude and Optimus 360 network interconnection

5.1.1 Evinrude ETEC G2 with iDock

The Evinrude G2 shift and throttle system and the Optimus 360 system connect together through the CAN1 and CAN2 network. CAN3 is used to broadcast system information to a public NMEA2000 network.

1. CAN1 connects via an adapter harness (CM20027) to BRP G2 private network 6 pin hub.
2. CAN2 connects to the BRP G2 engines public network as well as the G2 control head's public network and power node connector.
3. CAN3 connects to the NMEA2000 instrumentation network.
4. PCM ignition sense is connected to the key-on power wye harness. BRP part number 587230.

The G2 engine uses a specific steering position sensor that mounts on the engine.

The following parts are available through BRP:

- 5009215 – Steering position sensor iDOCK (2 required for dual, triple, or quad engines.)
- 768155 – Circuit breaker kit iDOCK (1 required for dual, triple, or quad engines.)

Triple and Quad engine use tie bar(s) to connect the center engine(s)

- 766568 – BRP tie bar 24–29 inch centers
- 766569 – BRP tie bar 29–36 inch centers

Figure 5-1 illustrates the network interconnection for a single station application. All adapter harnesses are identified in the figure.

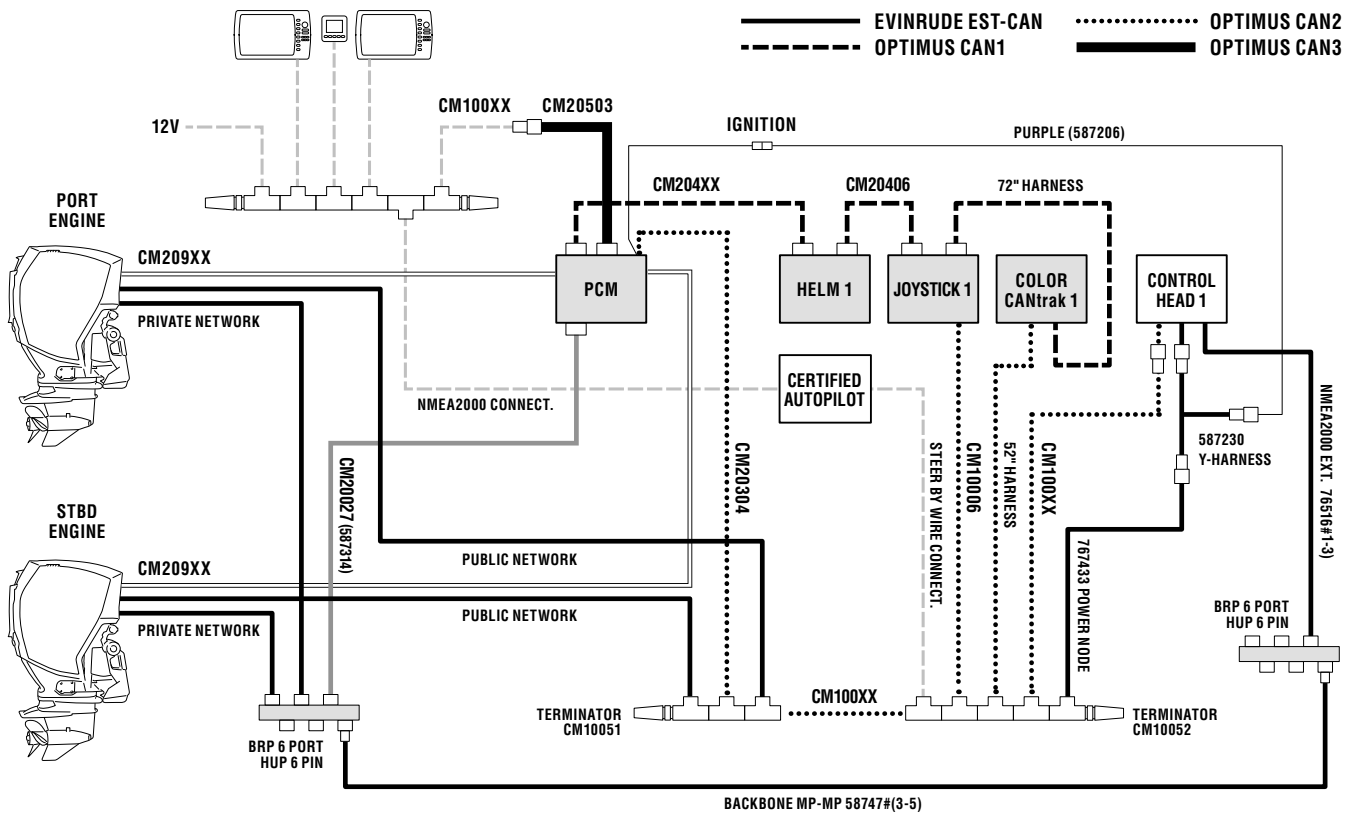


Figure 5-1. Evinrude G2 iDock – single station, twin engine.



NOTE

Configuration shown is a combination of Dometic and BRP components. Although a twin configuration is shown, the Optimus 360 connections are identical for triple and quad engine control.

6 Suzuki

To complete the system installation for a Suzuki SPC engine you need to:

1. Install the Suzuki control head (refer to installation instructions provided by Suzuki)
2. Install the Optimus EST gateway (section 6.1)
3. Complete the CAN network connections (section 6.2)
4. Configure the gateway (section 6.3)
5. Calibrate the system using the Suzuki Diagnostic Software tool (section 6.4)

Once you've completed these steps you can move on to the sea trial (Book 65) and then to the joystick setup (Book 65).

6.1 Gateway installation

The EST gateway is an electronic interface device that connects the Optimus control system to the OEM shift and throttle control system. It passes shift and throttle commands from the joystick to the OEM EST system, and monitors station selection, network status and ignition state.

Location

One gateway (EG1810) is required at the main control station. It should be installed underneath the dash and in close proximity to the control head. Section 6.2 details the required connections.

Installation

Install the gateway with the strain relief plate and screws as shown in figure 6-1. The preferred orientation is vertical with connections facing down, but it may also be installed horizontally. Avoid mounting the gateway with the connections facing upwards.

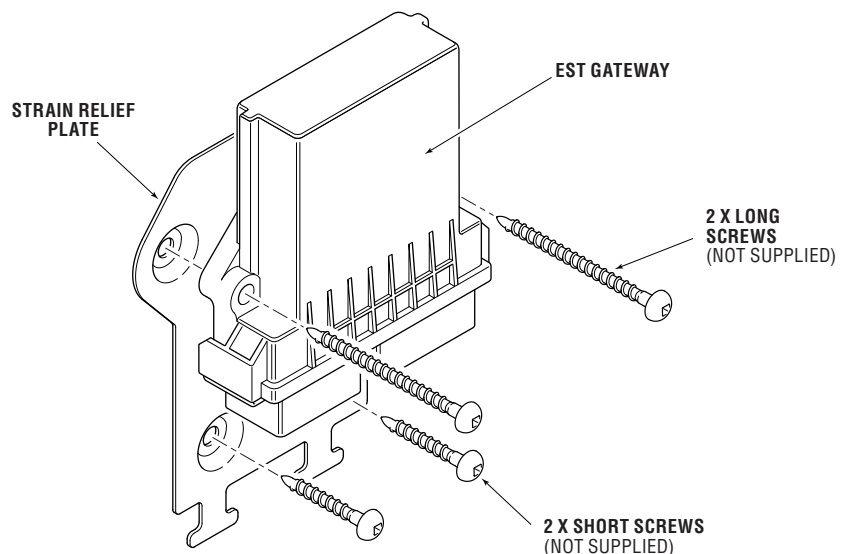


Figure 6-1 Gateway with strain relief plate.

6.2 Suzuki EST gateway & Optimus 360 interconnection



CAUTION!

All harness runs should be sufficiently bundled and strain relieved to avoid wear or accidental damage.

The Suzuki Precision Control (SPC) shift and throttle system connects to the Optimus 360 system through the EST Gateway, using the harness CM20018. The harness connects at the following points:

1. Suzuki boat control module (BCM) CAN network connector
2. Suzuki switch panel harness
3. Optimus EST gateway
4. Optimus CAN1 & CAN2 networks
5. Optimus PCM ignition sensing

Figure 6-2, figure 6-3, figure 6-4 and figure 6-5 show the network interconnections in schematic form.

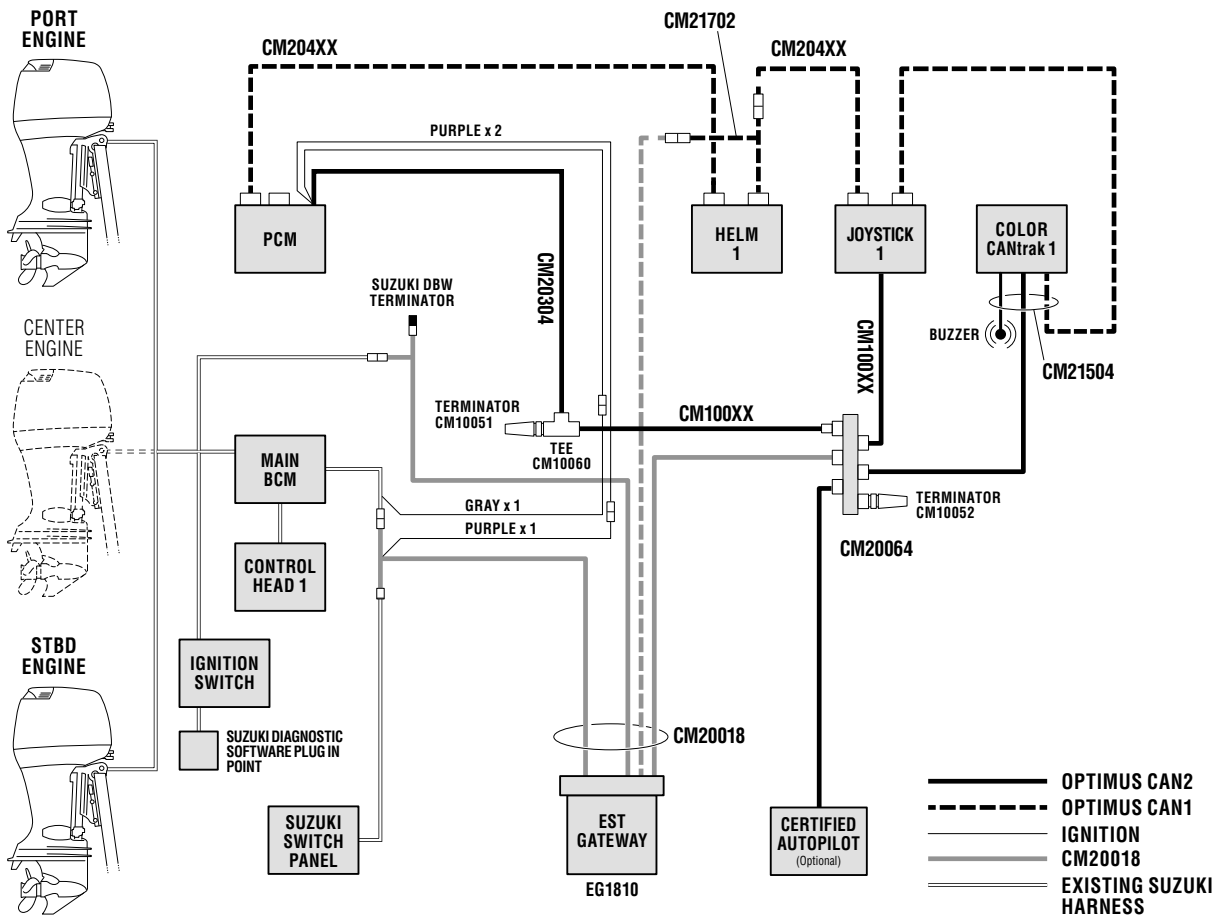


Figure 6-2. Suzuki EST single station, twin or triple engines.

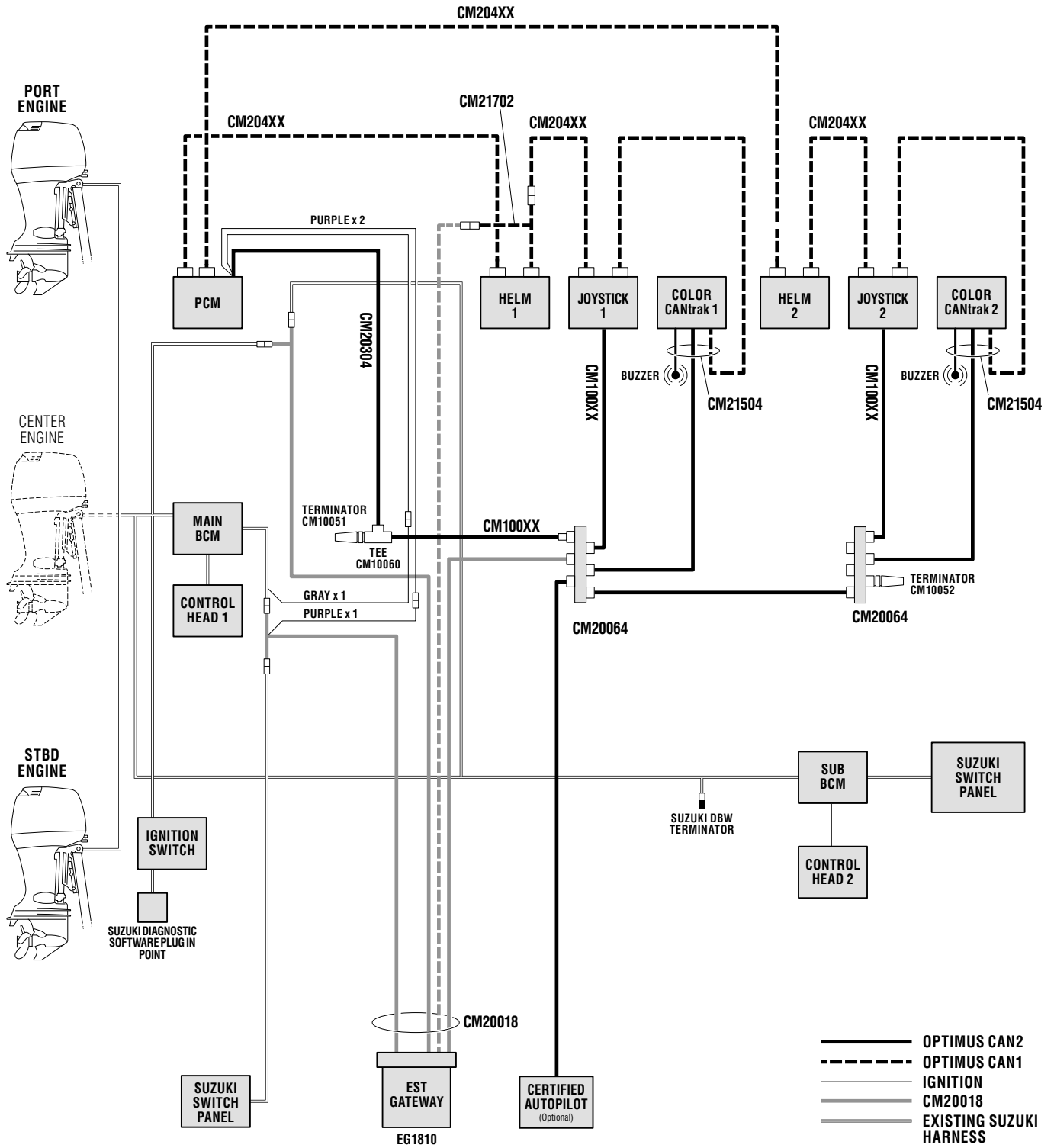


Figure 63. Suzuki EST dual station, twin or triple engines.

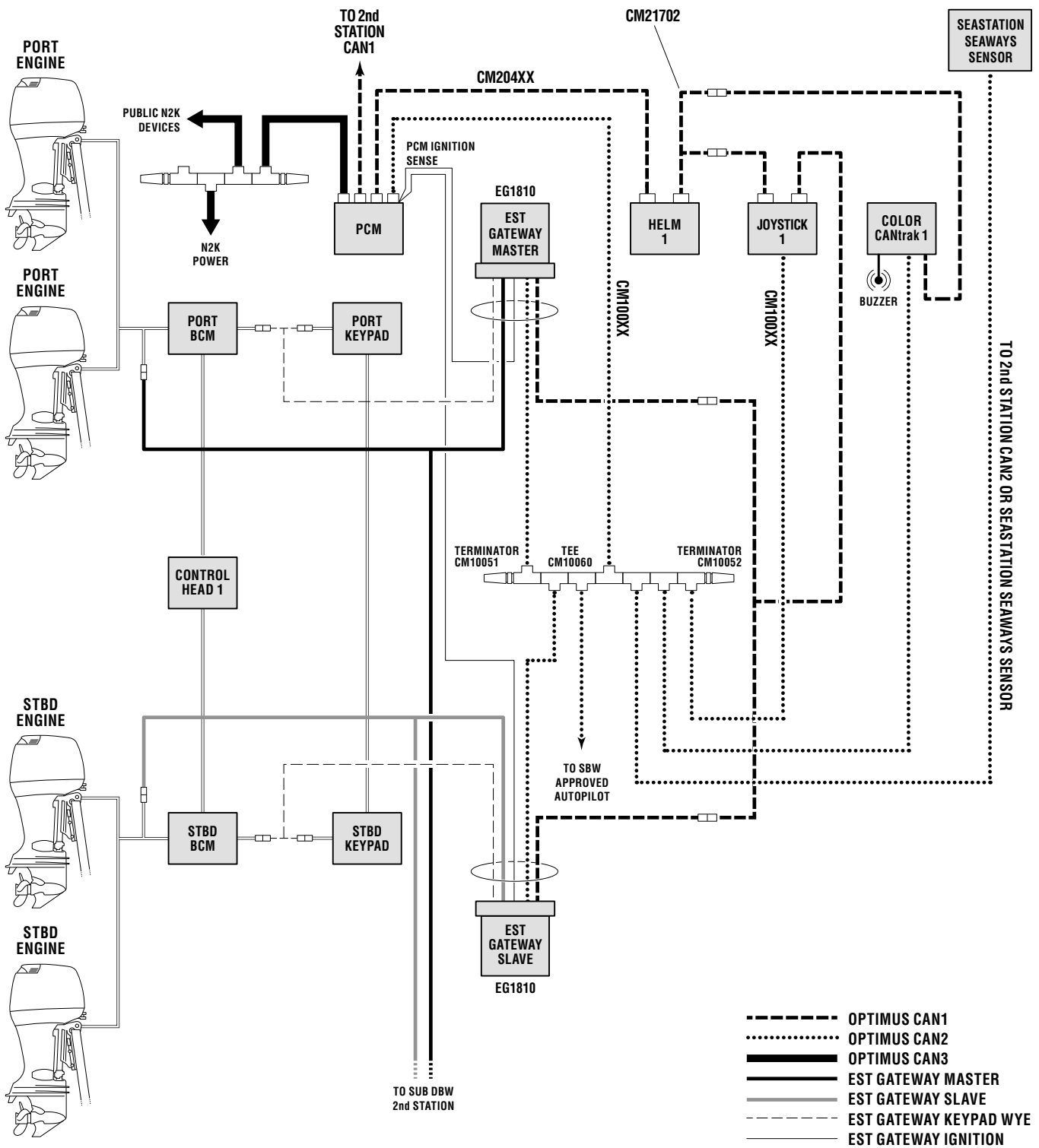


Figure 6-4. Suzuki EST single station, quad engines.

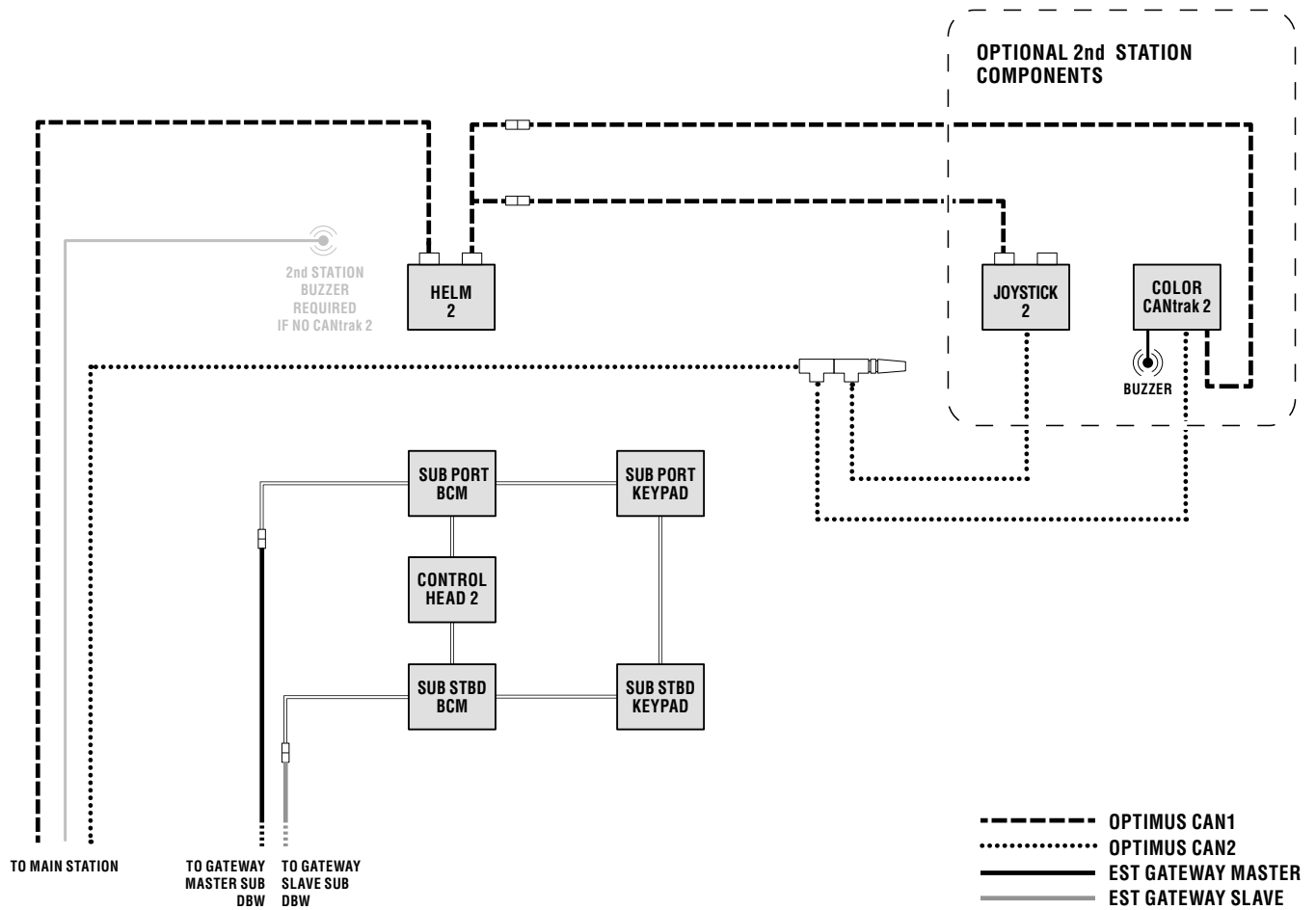


Figure 6-5. Suzuki EST 2nd station, quad engines.

6.2.1 Suzuki BCM CAN network connection

Locate the Suzuki CAN connection point on the Suzuki Main BCM harness behind the main station dash. Look for a twisted pair of wires (white and black) with a two-pin connector.

Single station boats – the connector will have a male network terminator plug installed in it. Remove the terminator plug and insert the CM20018 harness plug labeled '1st Station'. Install the terminator plug in the CM20018 harness receptacle labeled '2nd Station'. See figure 6-6.

Dual station boats – The connector will be connected to the Suzuki Sub BCM harness. Break the connection and connect the two halves to the CM20018 harness plugs. The Sub BCM harness will connect to the plug labeled '2nd Station' and the Main BCM harness to the plug labeled '1st Station.' See figure 6-6.

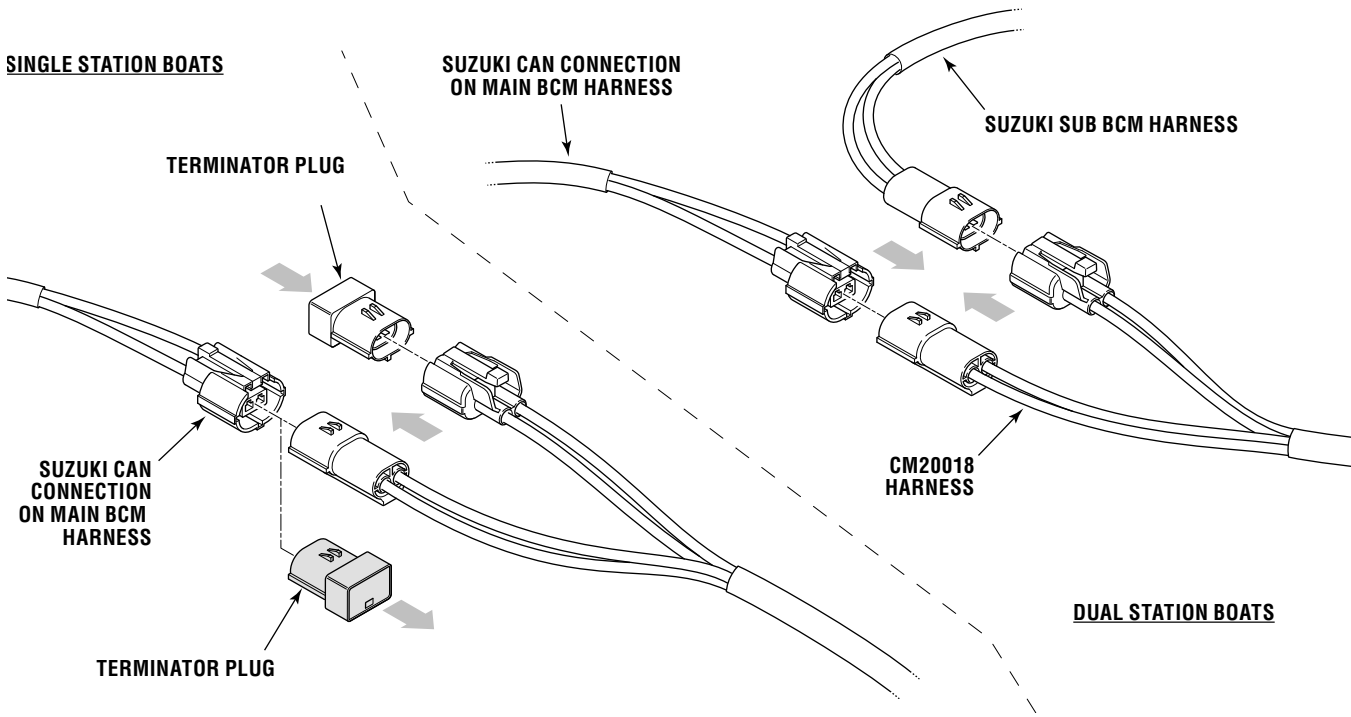


Figure 6-6. CM20018 connection to Suzuki CAN network.

6.2.2 Suzuki switch panel harness connection

Locate the sixteen pin connector in the harness connected to the switch panel. Disconnect the connector, then connect the two ends to the male and female connectors on the CM20018 harness, as shown in figure 6-7.

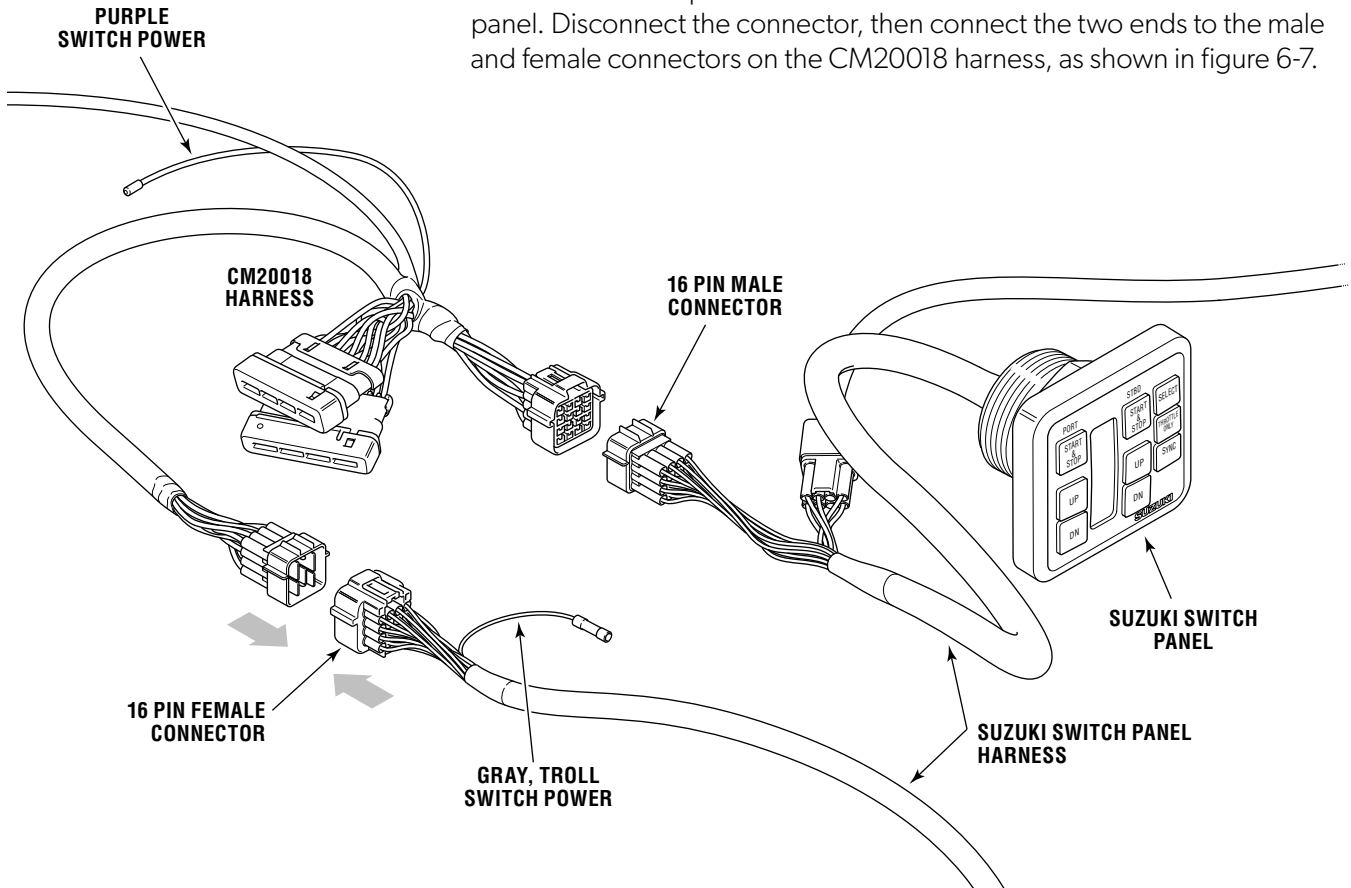


Figure 6-7. Switch panel harness connection.

6.2.3 Optimus EST gateway connection

Connect the two large connectors on the CM20018 harness to the gateway and tighten the screws to secure them. Use cable ties to secure the harness cables to the strain relief plate as shown in figure 6-8.

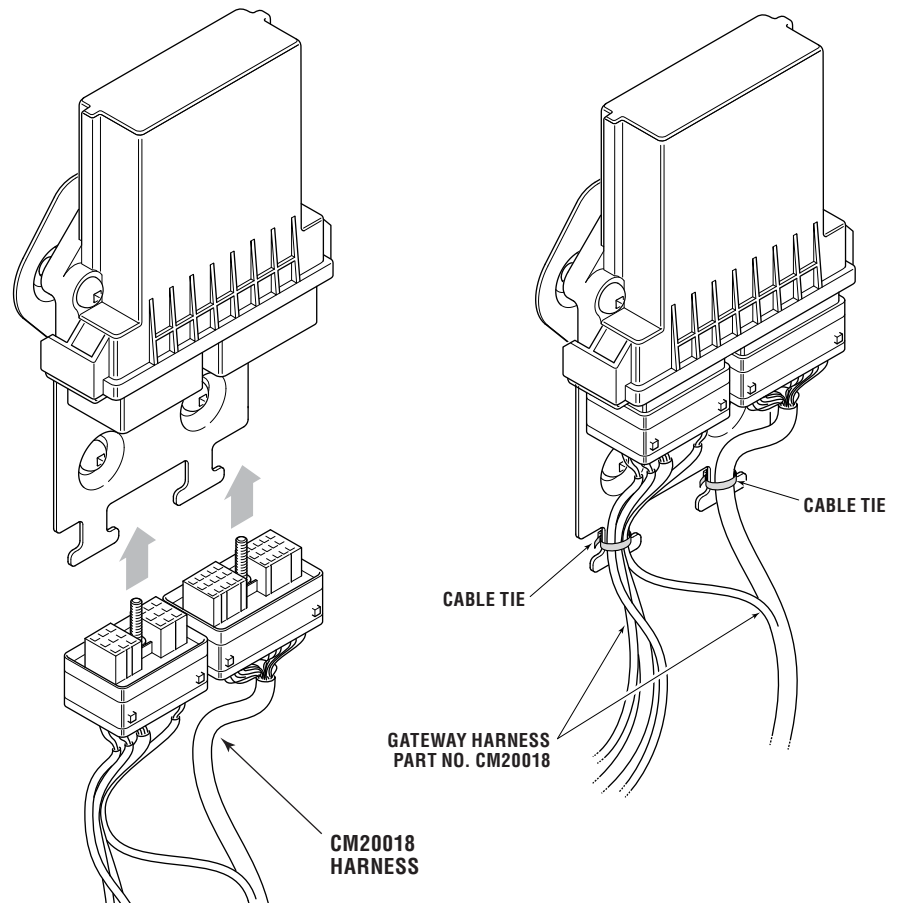


Figure 6-8. Harness connection to EST gateway.

6.2.4 Optimus CAN1 and CAN2 connections

The CM20018 harness has a CAN1 and a CAN2 connector. Connect these to the networks as shown in section 3. To make the CAN1 connection you may require the CM21702 wye harness shown in figure 6-2 and figure 6-3. The wye harness converts one CAN1 port into two.

6.2.5 Optimus PCM ignition sensing

There are two purple ignition sensing wires on the PCM harness CM20304. You need to connect both these wires to ensure that damage to one ignition wire does not cause the steering to shut down.



NOTICE!

If you are retrofitting an existing EPS installation these ignition sensing wires will have already been connected to the ignition key switch. Remove these connections and make the connections outlined below.

Splice one of the ignition sensing wires to the purple switch power wire on the CM20018 harness (see figure 6-7) using 16AWG (1.3 mm²) wire to make any necessary extensions. Use crimped Molex Perma-Seal (or equivalent) butt splice connectors, or shrink-sealed solder connections. Locate all splices in a dry location and secure them properly against mechanical damage.

Connect the second purple ignition sensing wire to the gray troll switch power wire on the Suzuki switch panel harness (see figure 6-7). The troll switch wire is supplied with a crimped female bullet connector, sealed with a black plastic plug. A mating bullet connector is included in the bag with the CM20018 harness. Crimp it to your ignition extension wire, then simply push the male connector bullet into the female receptacle to complete the connection (see figure 6-9). If required, additional bullet connectors can be ordered through a Suzuki distributor, using Suzuki part number 36990-87D00.

If the vessel is fitted with a Suzuki troll mode switch the troll switch wire will already be connected. In this case, the troll switch harness has an alternate point to connect the ignition. Look for the female bullet connector with two gray wires crimped into it.

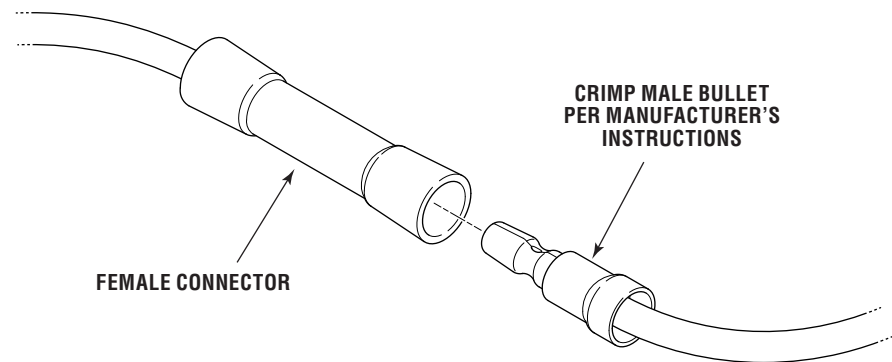


Figure 6-9. Male and female bullet connector.

6.3 Suzuki SPC system calibration



NOTICE!

Suzuki twin and triple-engine applications are a single network configuration and need to be calibrated using the SDS tool.

Suzuki quad applications are a 2 network configuration and need to be calibrated using the SDS tool twice — Once for the port engine pair and once for the starboard engine pair.

The Suzuki SPC system must be configured and calibrated in order to work with the Optimus joystick system. To calibrate the system you will need the Suzuki Diagnostic System (SDS) tool and the Suzuki diagnostic interface adapter (Suzuki part number 09933-19830). Connect the interface adapter and start the software according to the instructions provided by Suzuki.

When the software starts up you'll see the home screen shown in Figure 6-10. If you are updating an existing installation, click **BCM Initialization** to clear the existing calibration from memory, then cycle the power (leave off for ten seconds). Otherwise, continue with the following steps.

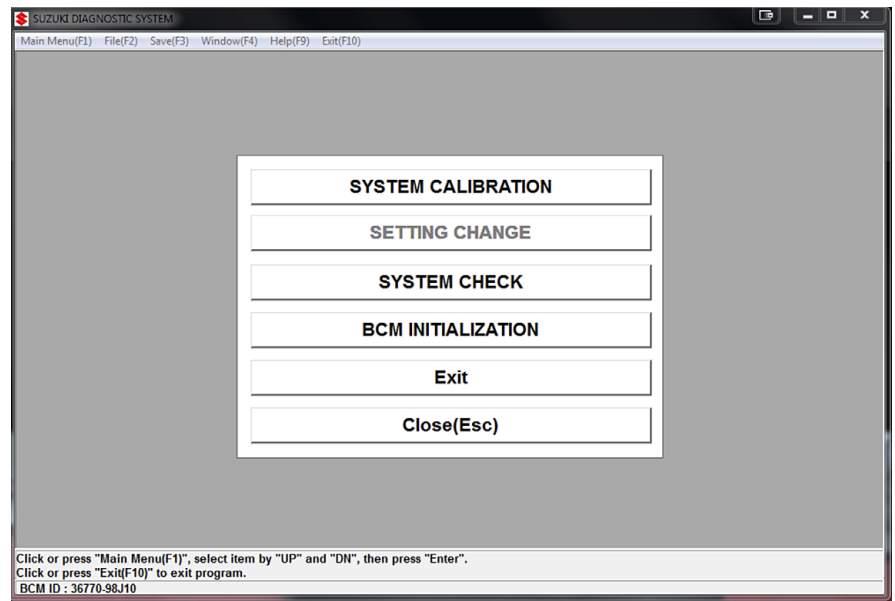


Figure 6-10. SDS home window.

1. Click **System Calibration** to start the calibration wizard. The dialog box shown in Figure 6-11 will be displayed. Review the checklist and when you've confirmed that all the items are complete, click **OK**.

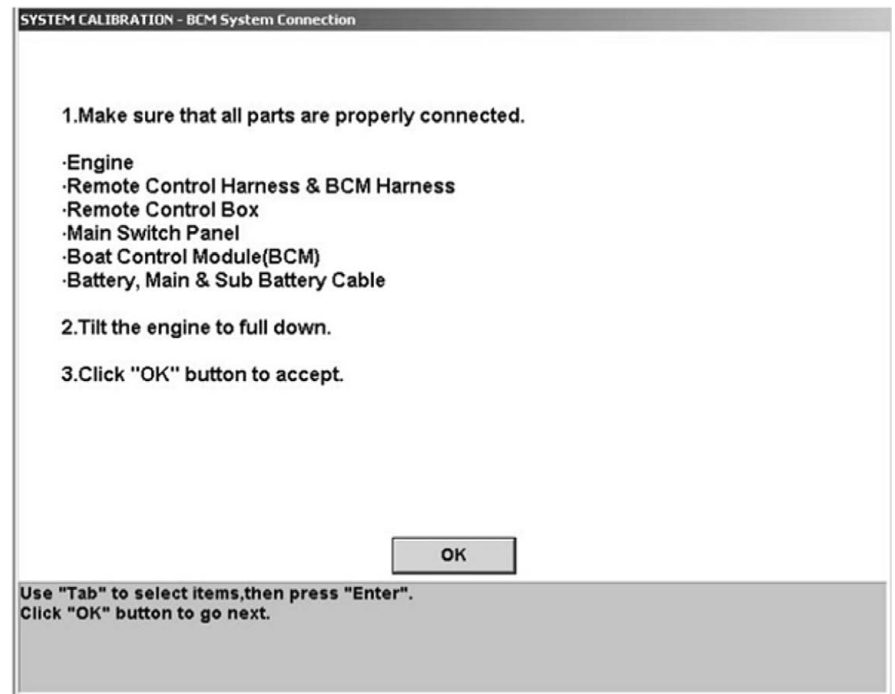


Figure 6-11. Pre-calibration checks.

2. You will be prompted to enter the number of stations and the number of engines. Always select Dual Station, regardless of the actual number of control stations. With the exception of the main remote control, all remote controls and joysticks are routed through the gateway and are treated as a second control station by the Suzuki system. Click **OK** when you've entered both parameters.

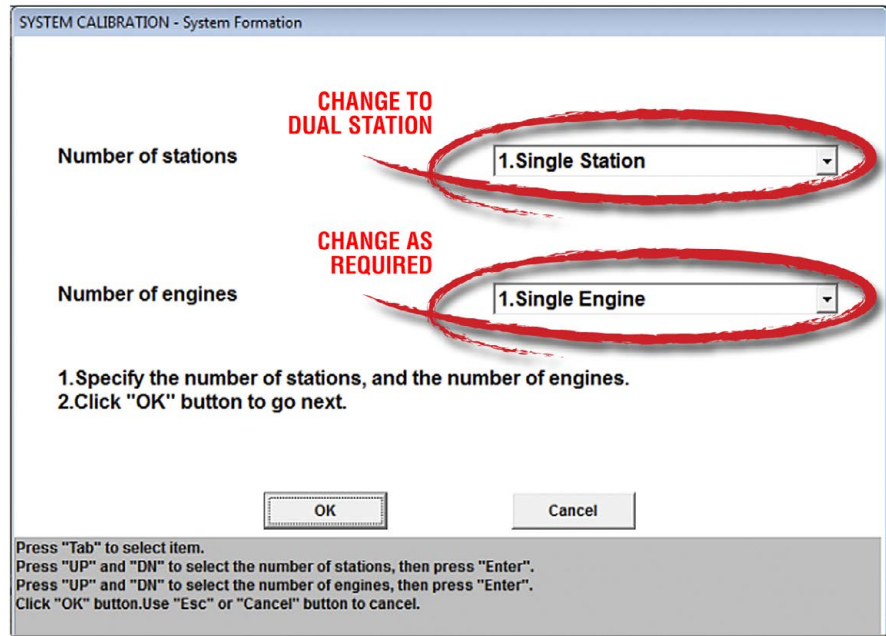


Figure 6-12. Configure number of stations and engines.

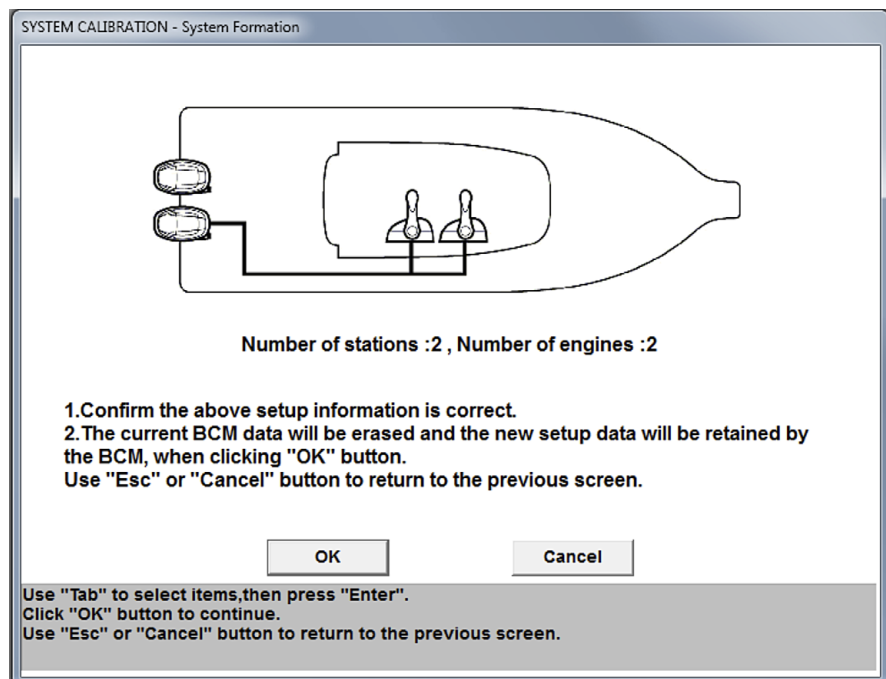


Figure 6-13. System calibration graphical confirmation window.

3. A confirmation window similar to Figure 6-13 will be shown. Ensure the information is correct, then click **OK**. Click **Cancel** to return to the previous screen if you need to make a change.
4. The wizard will then guide you to trim each engine down in turn in order to register their position in the boat control module (BCM). Follow the on-screen instructions. An example is shown in Figure 6-14.

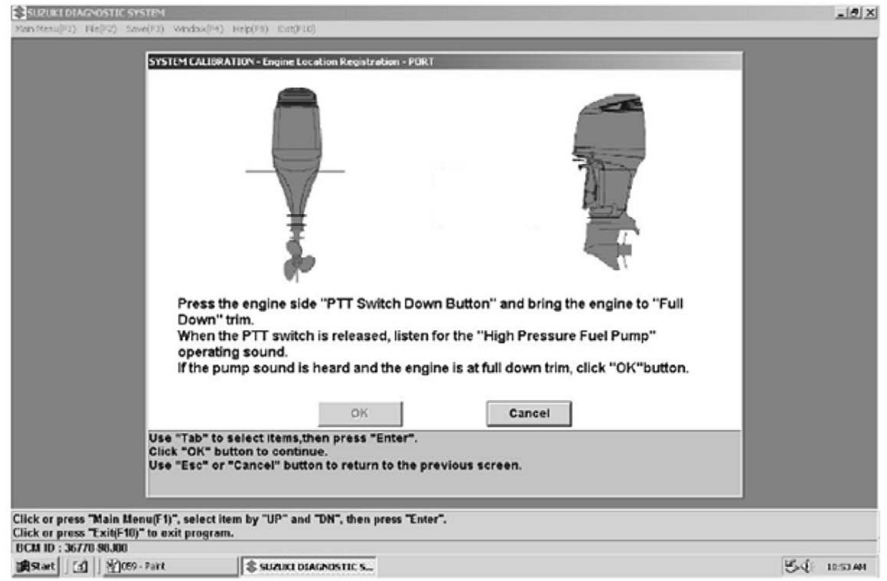


Figure 6-14. Registering the engine position

5. Once each engine's position has been registered you will be prompted to calibrate the remote control lever positions. Using the main remote control, follow the on-screen instructions as seen in Figure 6-15.

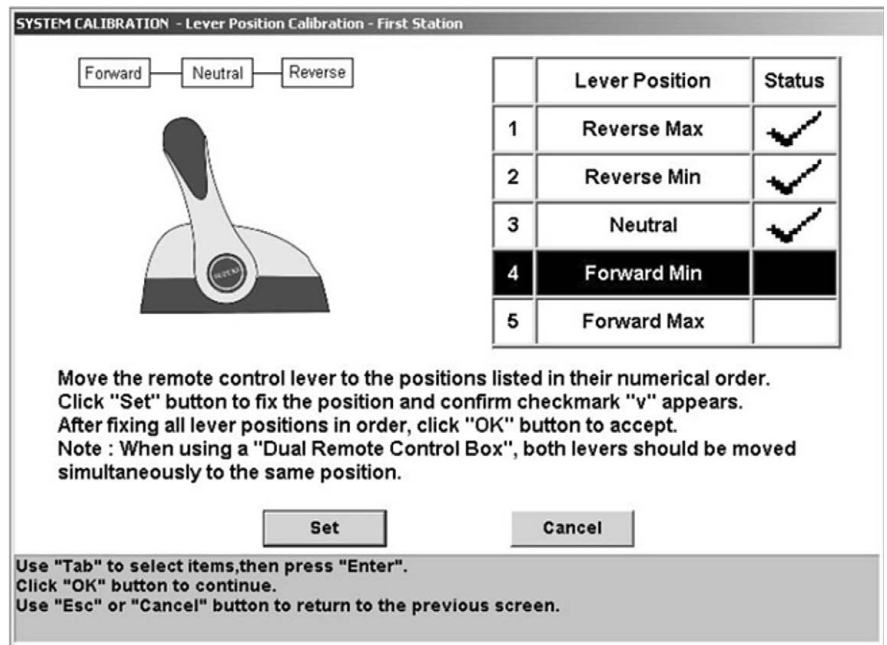


Figure 6-15. Control Head calibration.

- When all lever positions have been set, and the screen shows check marks next to all of them (see Figure 6-16), return the control levers to the neutral position and click **OK** to save the calibration.

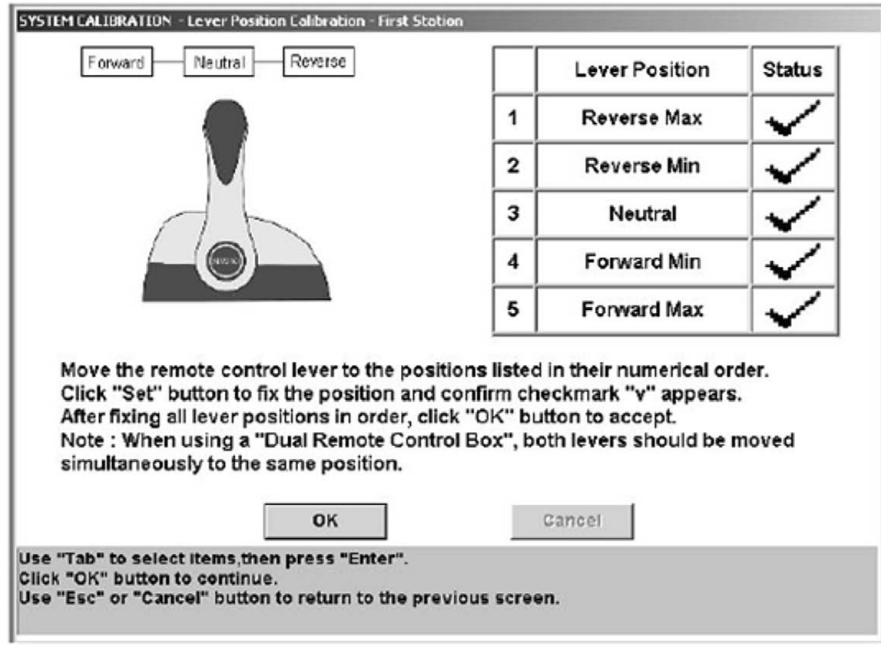


Figure 6-16. Save calibrated values.

- You will be prompted to calibrate the second remote control. If the boat has a second remote control, calibrate it now. If the boat has only a single remote control you will use the joystick lever to perform the calibration. Use table 6-1 to find the joystick position that corresponds with each lever position shown in the calibration wizard. Move the joystick all the way in each required direction, then click **Set**.

Step	Suzuki lever position	Joystick equivalent position
1	Reverse Max	Reverse
2	Reverse Min	Port
3	Neutral	Center
4	Forward Min	Starboard
5	Forward Max	Forward

Table 6-1. Lever to joystick position cross-reference.

- After you have clicked **OK** to save the calibration you will see a final dialog box indicating that the system calibration has been completed. Click **OK** to return to the main menu.
- Cycle the power (off for ten seconds) and then click **System Check** on the SDS home screen. This will bring up a window displaying Service Data. Check that there are eight LPS Output(...) items in the list with an associated voltage reading for each. See Figure 6-17.

Master BCM		Select	
Item	Data	Unit	
LPS OUTPUT 1ST(P-M)	2.11	V	
LPS OUTPUT 1ST(P-S)	2.68	V	
LPS OUTPUT 1ST(S-M)	2.25	V	
LPS OUTPUT 1ST(S-S)	2.89	V	
LPS OUTPUT 2ND(P-M)	2.19	V	
LPS OUTPUT 2ND(P-S)	2.79	V	
LPS OUTPUT 2ND(S-M)	2.19	V	
LPS OUTPUT 2ND(S-S)	2.79	V	
ETV TRGT ANGLE(PORT)	1.00	V	
ETV TRGT ANGLE(STBD)	1.00	V	

Use "UP" and "DN" to select item group, then press "Enter".
 To select items displayed, move to "Select" button by "Tab", then press "Enter". Click or press "Save(F3)" to save data.
 Use "Esc" to close SERVICE DATA.

Figure 6-17. Service Data. Sample of typical values.

TECH TIP

You are now ready to sea trial the steering system. Refer to book 65. When the sea trial is complete, proceed to the joystick setup in section 9 of this manual.

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7 Yamaha

The Optimus 360 Joystick system supports Yamaha DEC and Yamaha EX EST types. To complete the system installation for a Yamaha engine you need to:

1. Connect the gateway harness to the Yamaha remote control. Refer to Section 7.1.1 for Yamaha DEC and Section 7.2.1 for Yamaha EX
2. Install the Optimus EST gateway. Refer to Section 7.1.2 for Yamaha DEC and Section 7.2.2 for Yamaha EX
3. Complete the CAN network connections. Refer to Section 7.1.3 for Yamaha DEC and Section 7.2.3 for Yamaha EX
4. Configure the gateway (Section 7.3)

Once you've completed these steps, you can move on to the sea trial (Book 65) and then to the joystick setup (Book 65).

7.1 Yamaha DEC

The Yamaha DEC (Digital Electronic Control) shift and throttle system connects to the Optimus 360 system through the EST Gateway, using the harness CM20023 (CM20025 for quad-engine boats). The gateway in turn connects to the Optimus 360 CAN1 and CAN2 networks, the Yamaha Command Link or Command Link Plus network, and the PCM ignition, through the same harness. Optimus 360 supports twin, triple and quad engine applications for boats with single or dual helm stations. An EST gateway is required at each station that has a joystick installed.

7.1.1 Yamaha DEC remote control connections

The EST Gateway harness (CM20023) connects to the Lever Position Sensor (LPS) and station status indicator (LED) harnesses at the remote control binnacle. These connections are illustrated in the figures that follow. Although a twin-engine remote control is shown, the connections are identical for a triple-engine control. A quad-engine boat requires some additional connections detailed in the text. Additional harness connections are shown in the schematic diagrams in section 7.3.

1. Ensure the power is switched off to the system.
2. Remove the two screws securing the binnacle cover. (Refer to figure 7-1.)
3. Remove the four screws that mount the control head binnacle to the dash. (Refer to figure 7-1.)



NOTICE!

If the remote control is not yet installed, ignore the instructions regarding removal from the dash.

4. Remove the control head from the dash far enough to expose the cover mounting screws. (Refer to figure 7-2. Port side is shown.) Both sides will need to be removed, but it is recommended that you proceed with one side at a time. Be sure to support the control head so that the harnesses are not under strain.
5. Cut the cable tie securing the harnesses to the binnacle chassis. (Refer to figure 7-2.)
6. Disconnect the Yamaha LPS harness. The port harness will be identified with a 'P' and the starboard harness will be identified with an 'S'. (Refer to figure 7-2.) Triples and quads: There will be harnesses labeled CP and/or CS. You will not use these harnesses for a triple, but you will need to connect them for a quad. Disconnect only one harness at a time. The connectors are only labeled on one end, and it is very easy to mix them up if both are disconnected.
7. Connect the EST gateway harness as shown in figure 7-3. Port harness is identified 'P_LPS' and the starboard harness is identified 'S_LPS.'

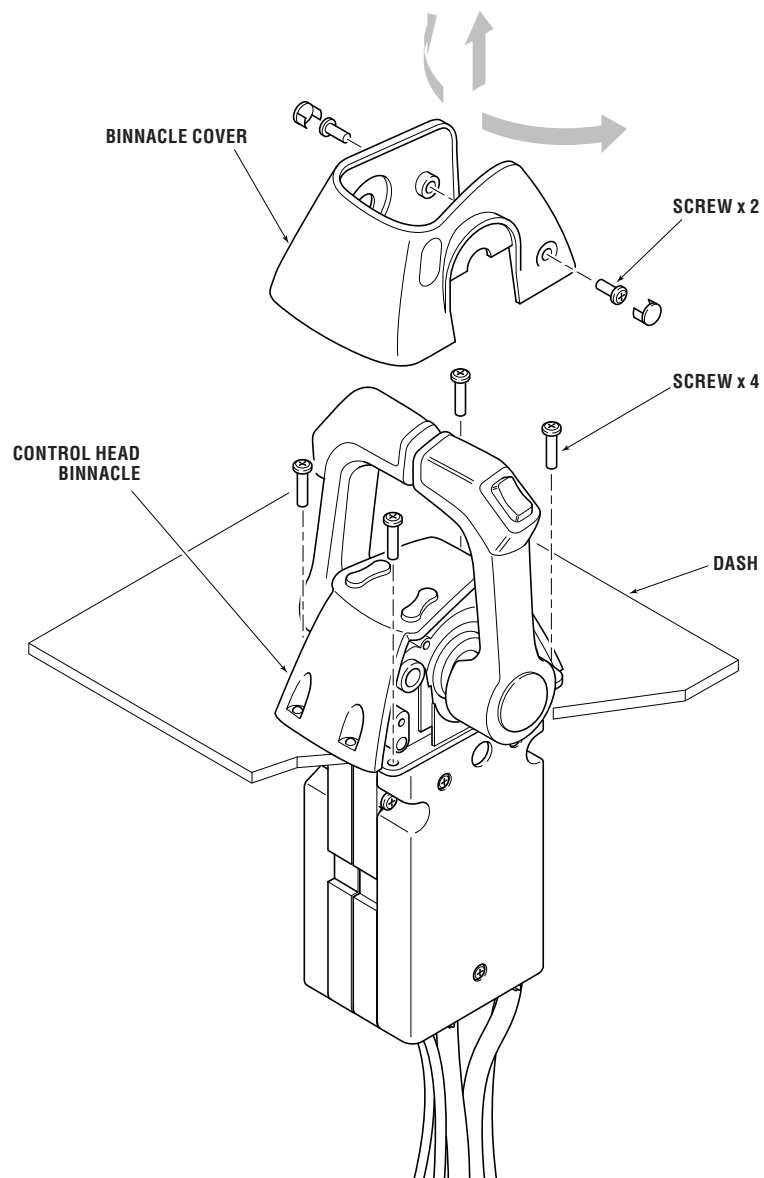


Figure 7-1. Control Head Binnacle removal.

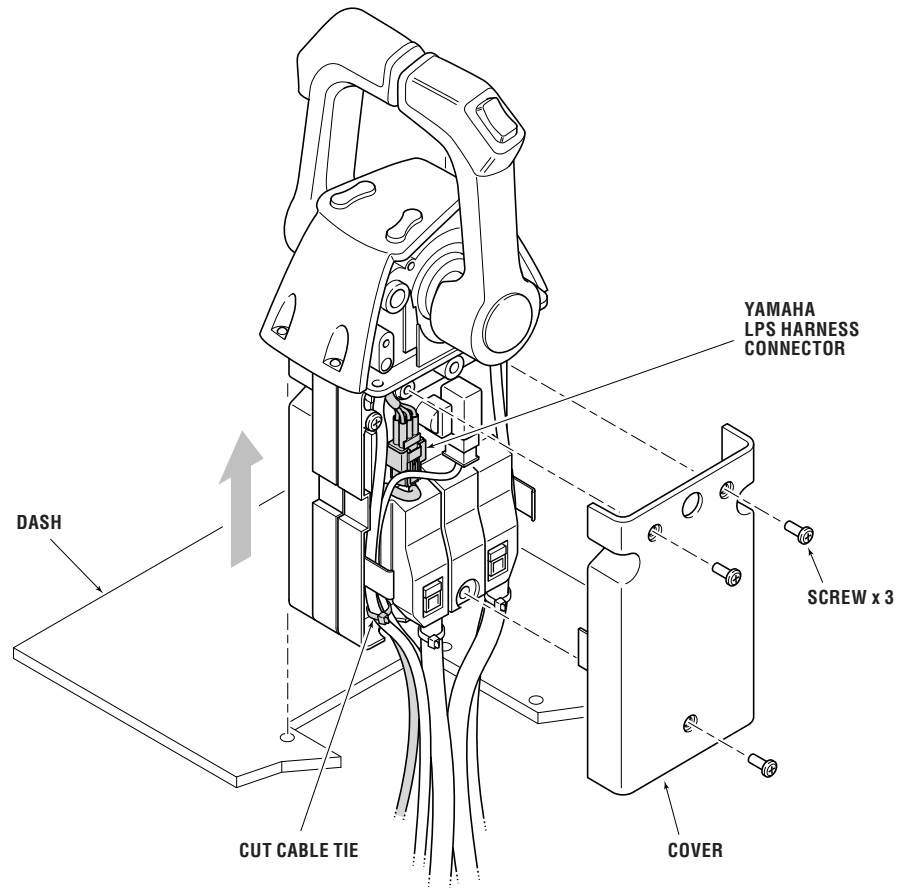


Figure 7-2. Cover removal and LPS harness identification.

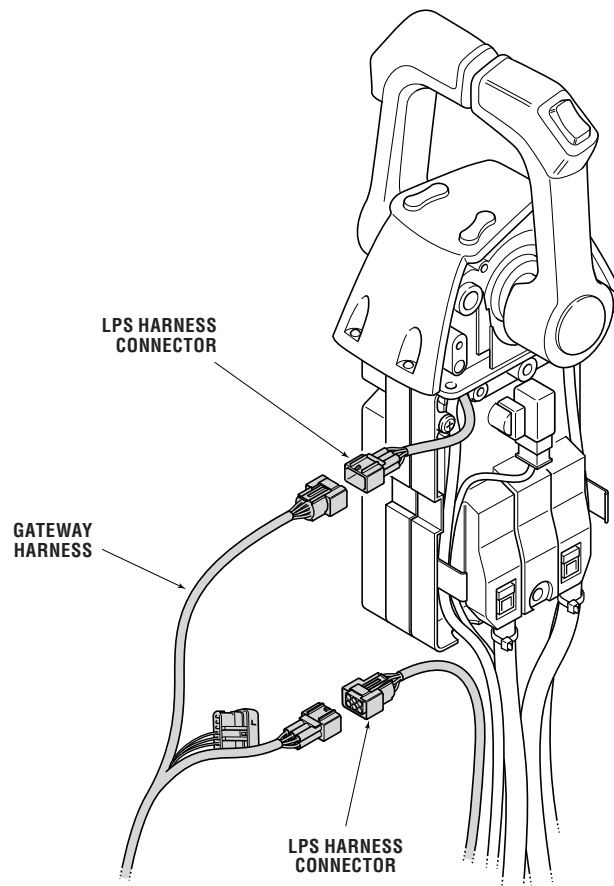


Figure 7-3. Gateway harness connection.

8. Install a new cable tie to secure the harnesses to the chassis and re-install the cover. (Refer to figure 7-4.)

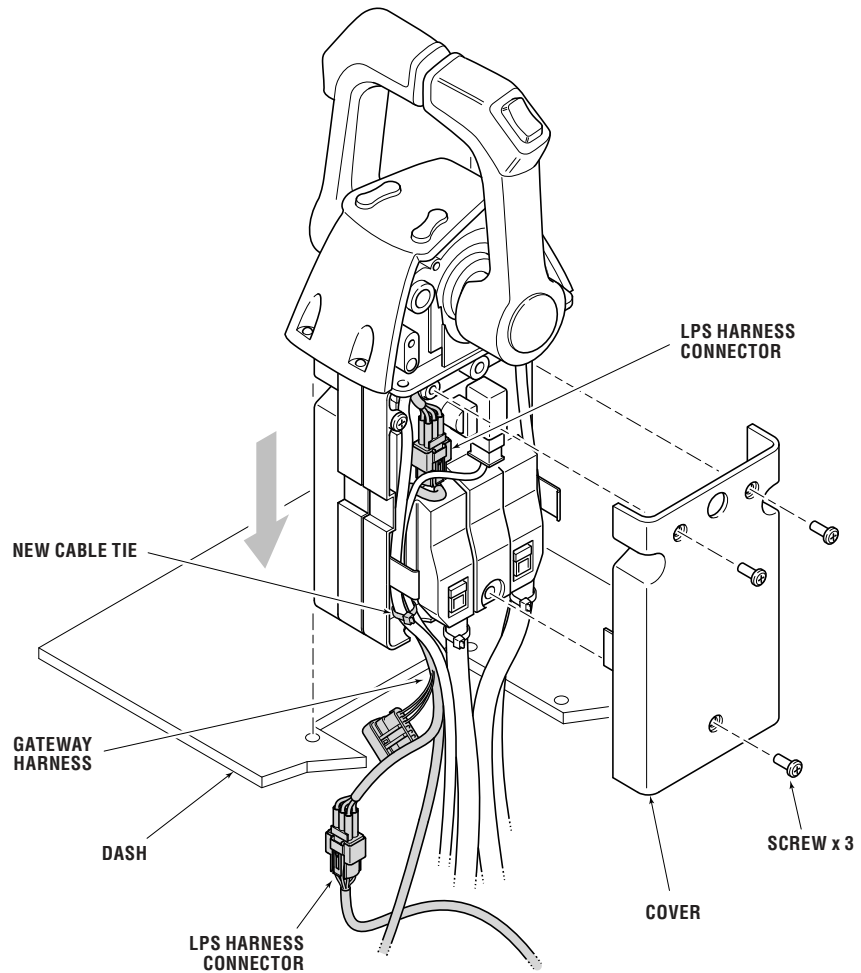


Figure 7-4. Cable tie and cover installation.

9. Repeat steps 5–8 for the other side.
10. Re-install the control head in the dash. Take care not to pinch or damage any harnesses. Re-install the binnacle cover. This is a reversal of the removal procedure shown in step 2 and 3.
11. Twins and triples: From behind the dash, find the 9-pin connection from the control head, disconnect it, and plug the connectors to the portion of the gateway harness labeled 'LED' (Refer to figure 7-5).
Quads: Behind the trim switch panel you will find two 9-pin connectors, one for each pair of engines (port pair and starboard pair). Open the port connection and connect the gateway harness connectors labeled 'P LED.' Repeat for the starboard connection with the connectors labeled 'S LED.'



CAUTION!

All harness runs should be sufficiently bundled and strain relieved to avoid accidental damage.

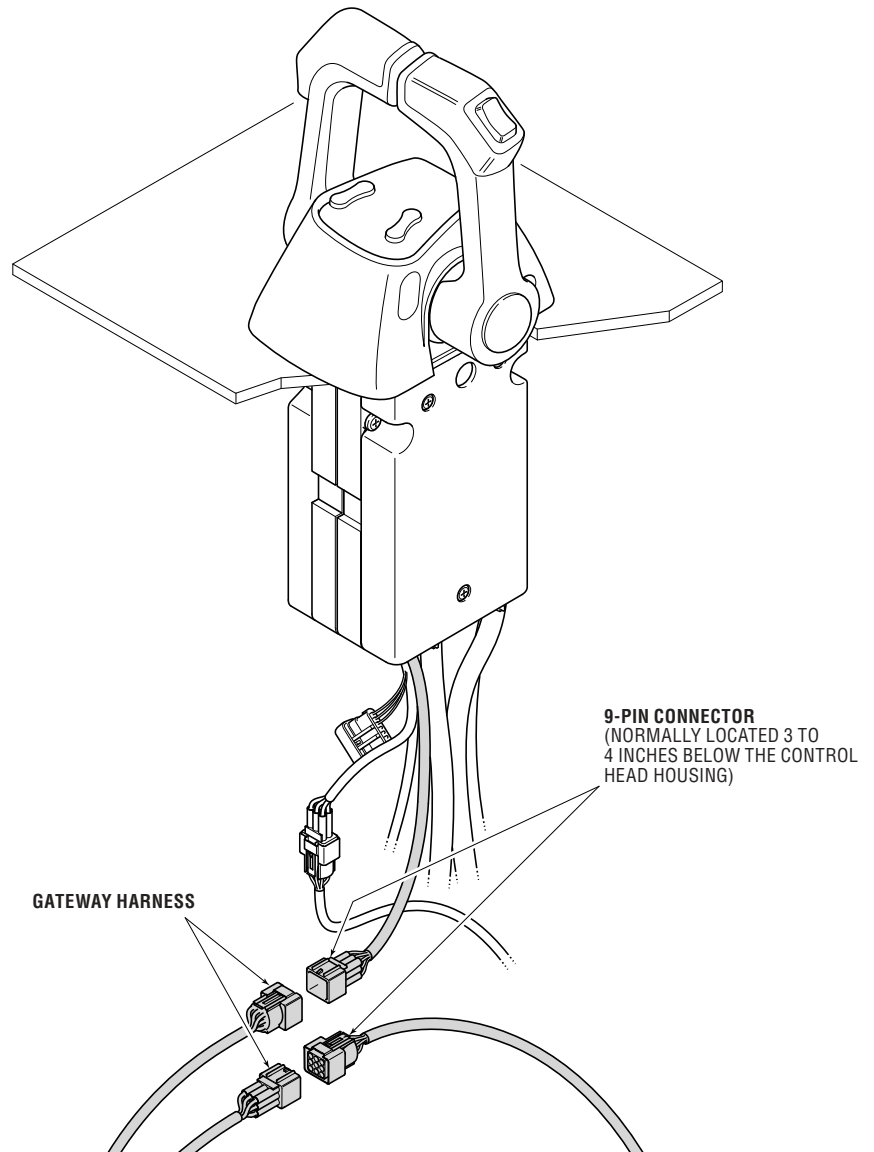


Figure 7-5. Status LED connector identification and connection.

7.1.2 EST gateway installation for Yamaha DEC

The EST gateway is an electronic interface device that connects the Optimus control system to the OEM shift and throttle control system. It passes shift and throttle commands from the joystick to the engine manufacturer's EST system, and monitors station selection, network status and ignition state.

Location

A gateway (EG1820) is required at each control station equipped with a joystick. It should be installed underneath the dash and as close as practical to the control head. Before installation, test fit with harness CM20023 to ensure that the harness connects to the remote control and the gateway without strain.

Installation

Install the gateway with the strain relief plate and screws as shown in figure 7-6. The preferred orientation is vertical with connections facing down, but it may also be installed horizontally. Avoid mounting the gateway with the connections facing upwards.

Use cable ties to secure the harness cables to the strain relief plate as shown in figure 7-7.

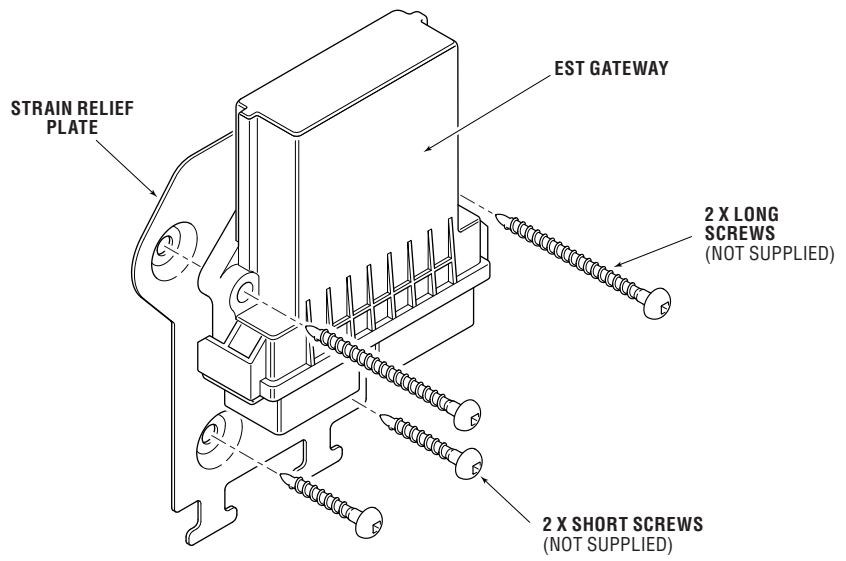


Figure 7-6 Gateway with strain relief plate.

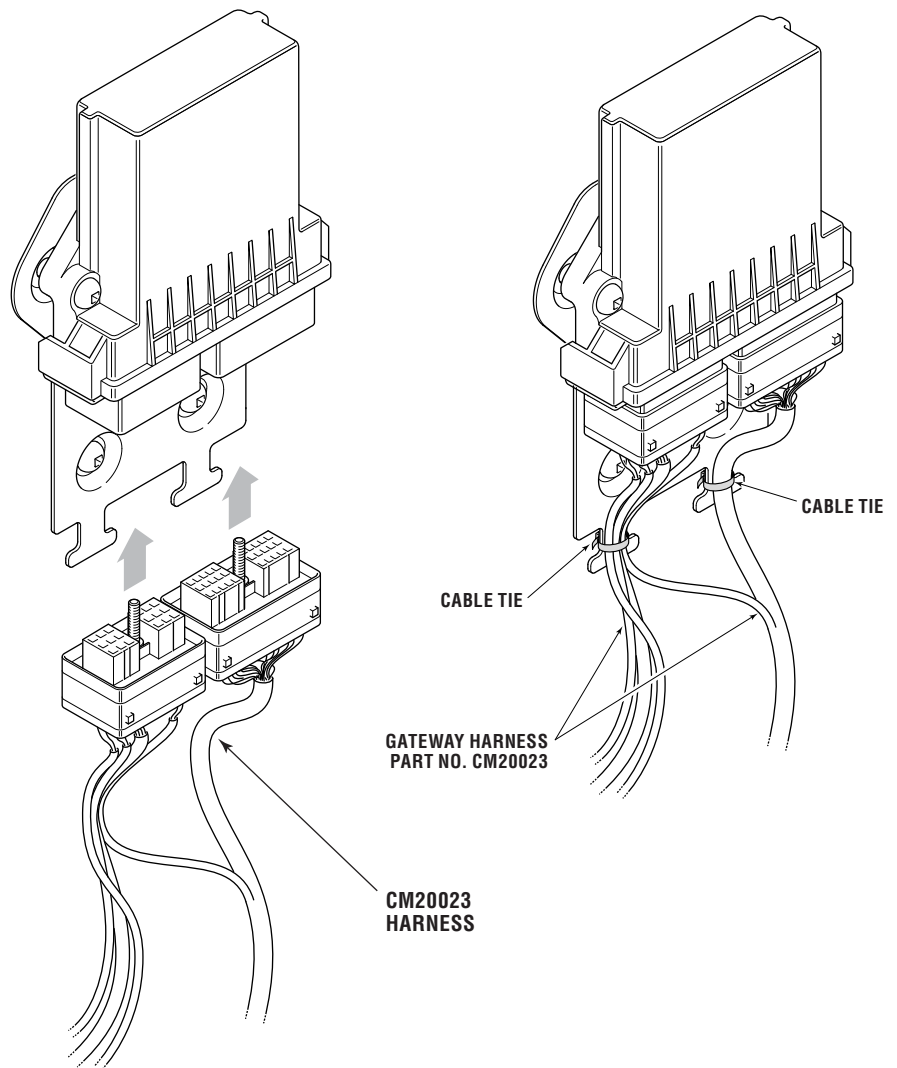


Figure 7-7. Harness connection to EST gateway.

7.1.3 Yamaha DEC EST gateway and Optimus 360 connection

The Yamaha DEC (Digital Electronic Control) shift and throttle system connects to the Optimus 360 system through the EST Gateway, using the harness CM20023 (CM20025 for quad-engine boats). The gateway in turn connects to the Optimus 360 CAN1 and CAN2 networks, the Yamaha Command Link or Command Link Plus network, and the PCM ignition, through the same harness.

Twins and Triples: Figure 7-8 and figure 7-9 show the interconnections for single and dual station implementations. Although the figures show twin engine configurations, the Optimus and gateway connections are identical for a triple engine boat. You may need to add additional Command Link/ Plus hubs if there is no port available to connect the gateway harness. Refer to the Yamaha documentation for part numbers.



NOTICE!

Quads – There are two types of configurations for connecting the Optimus 360 to Yamaha Quad systems. They are:

Generation 1 – will have 4 ignition keys to start each of the engines.

Generation 2 – will have 1 ignition key to start all the engines.

Quads – Generation 1: As shown in figure 7-10 and figure 7-11, the quad (Generation 1) Yamaha system is rigged with two independent CommandLink Plus networks. The Optimus EST Gateway must connect to both of them with gateway harness CM20025. It is important that the harness connectors are mated with the correct hub. (i.e. The connector labeled 'P CLP' must be connected to the CL+ hub for the port pair of engines.)

Quads – Generation 2: The quad (Generation 2) Yamaha system as shown in figure 7-12 and figure 7-13, is rigged with one CommandLink Plus hub. The Optimus EST Gateway must connect to the hub with the connector labeled 'P CLP' on the gateway harness CM20025.

The unused 'S CLP' will be capped with the cap provided.

Download the latest software revision that includes the latest Generation 2 configuration and follow the steps in Book 65 (PID# 682170) to tune the Joystick.

The gateway harness has two purple ignition leads to provide the ignition-on signal to the PCM. Splice them to the two purple ignition leads on the PCM CAN2 harness CM20304. It is not important which wire connects to which, only that both are connected. (If this is a retrofit to an existing Optimus steering system, leave the existing ignition connection as is and ignore the purple wires on the gateway harness.) Use crimped Molex Perma-Seal (or equivalent) butt splice connectors, or shrink-sealed solder connections. Locate all splices in a dry location and secure them properly against mechanical damage.

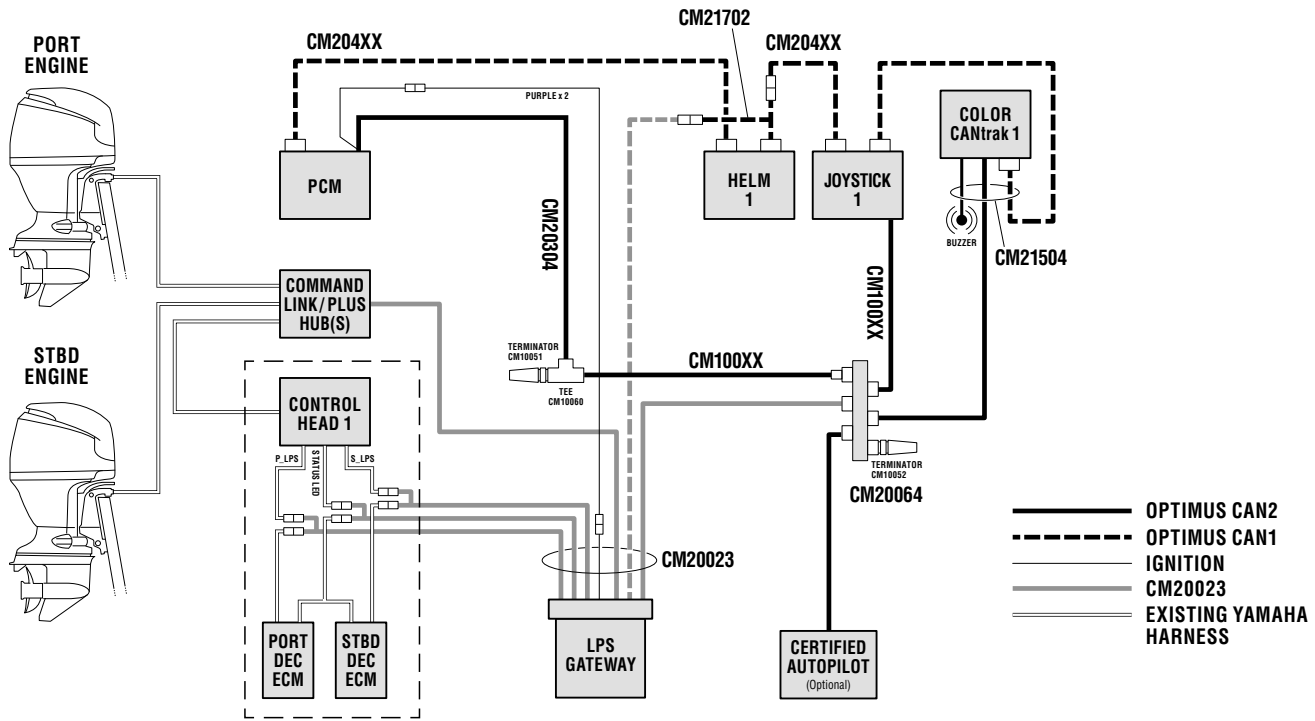


Figure 7-8. Yamaha EST – CAN2 interconnection, single station, twin engine.

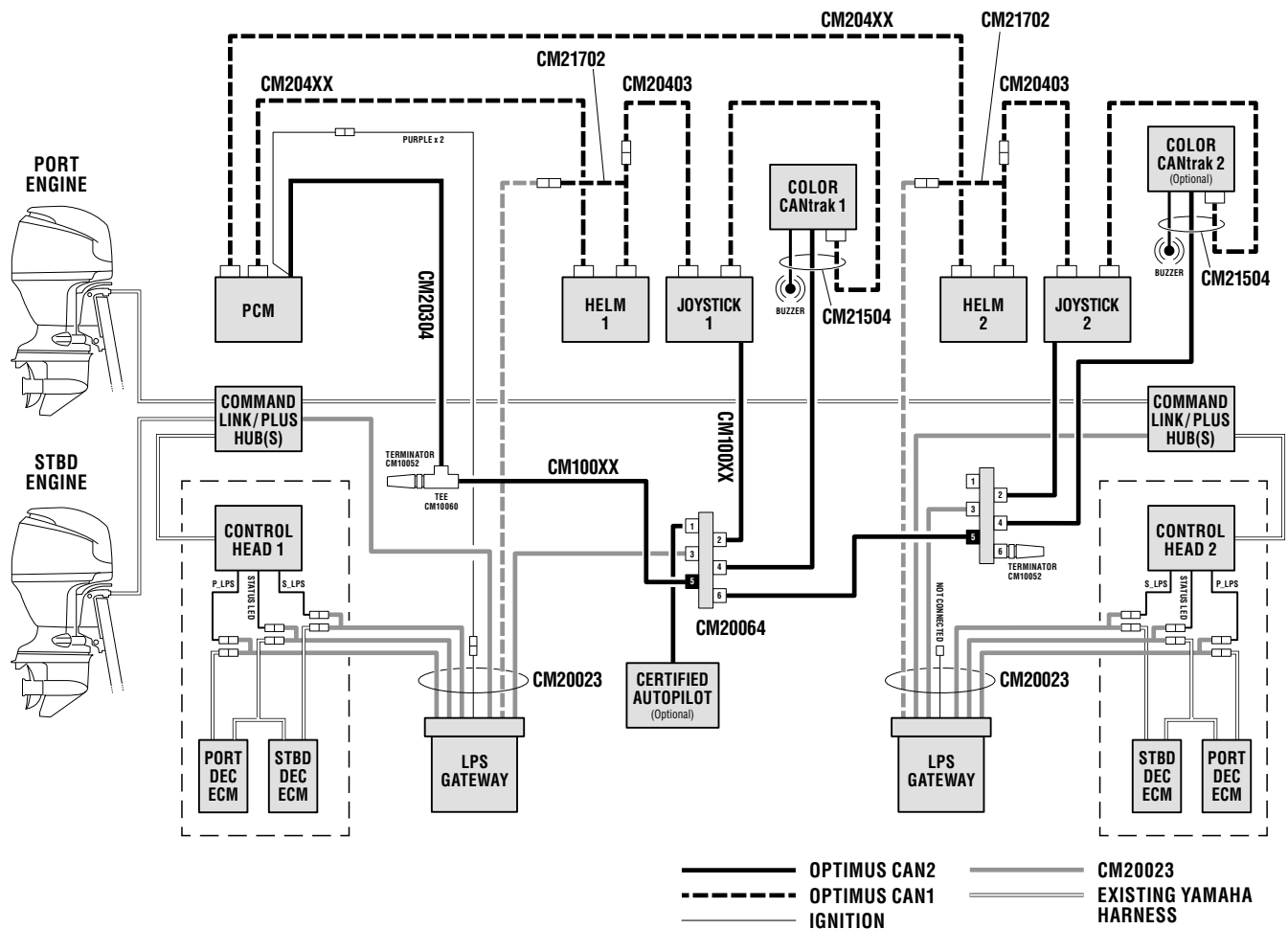
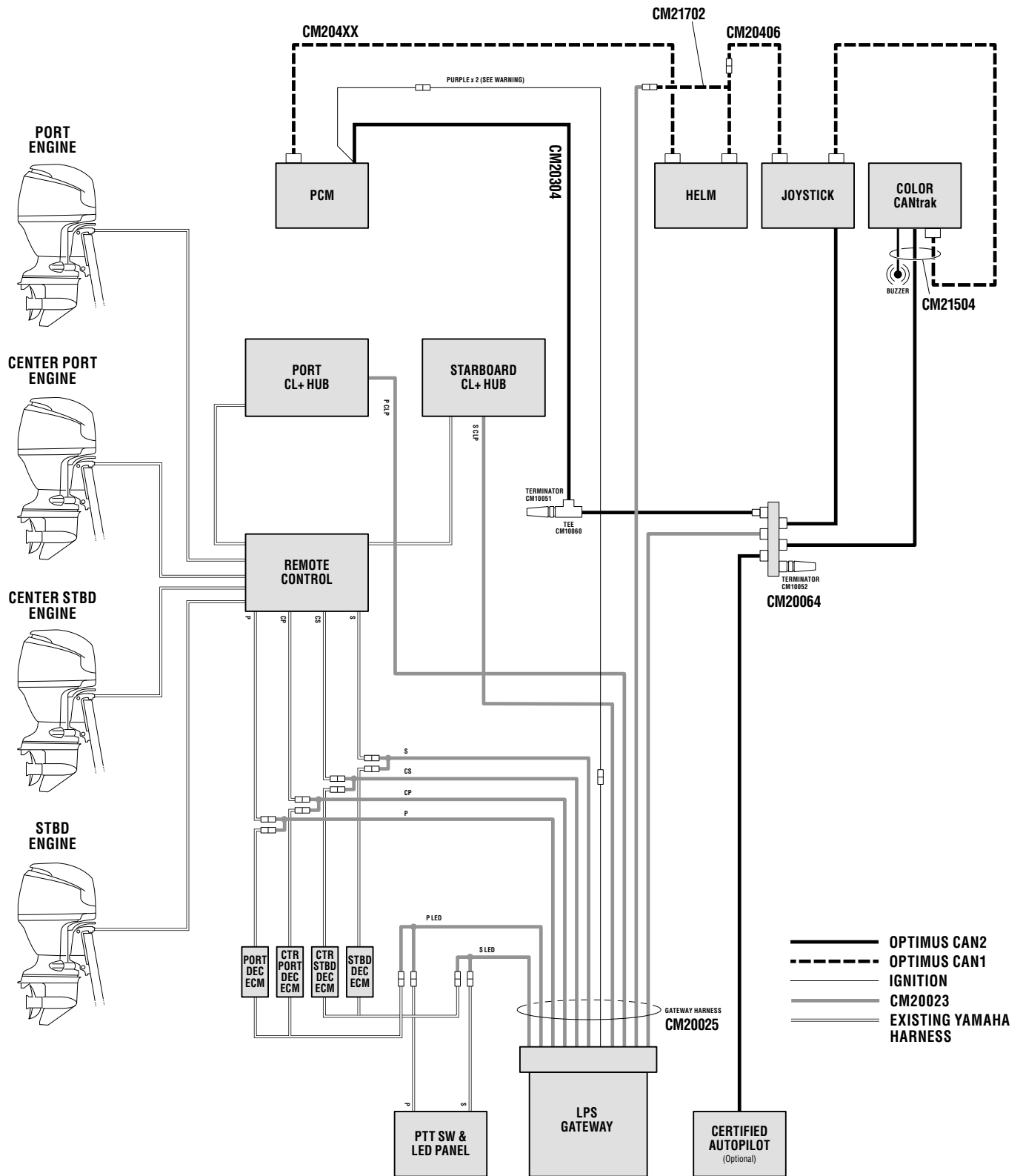


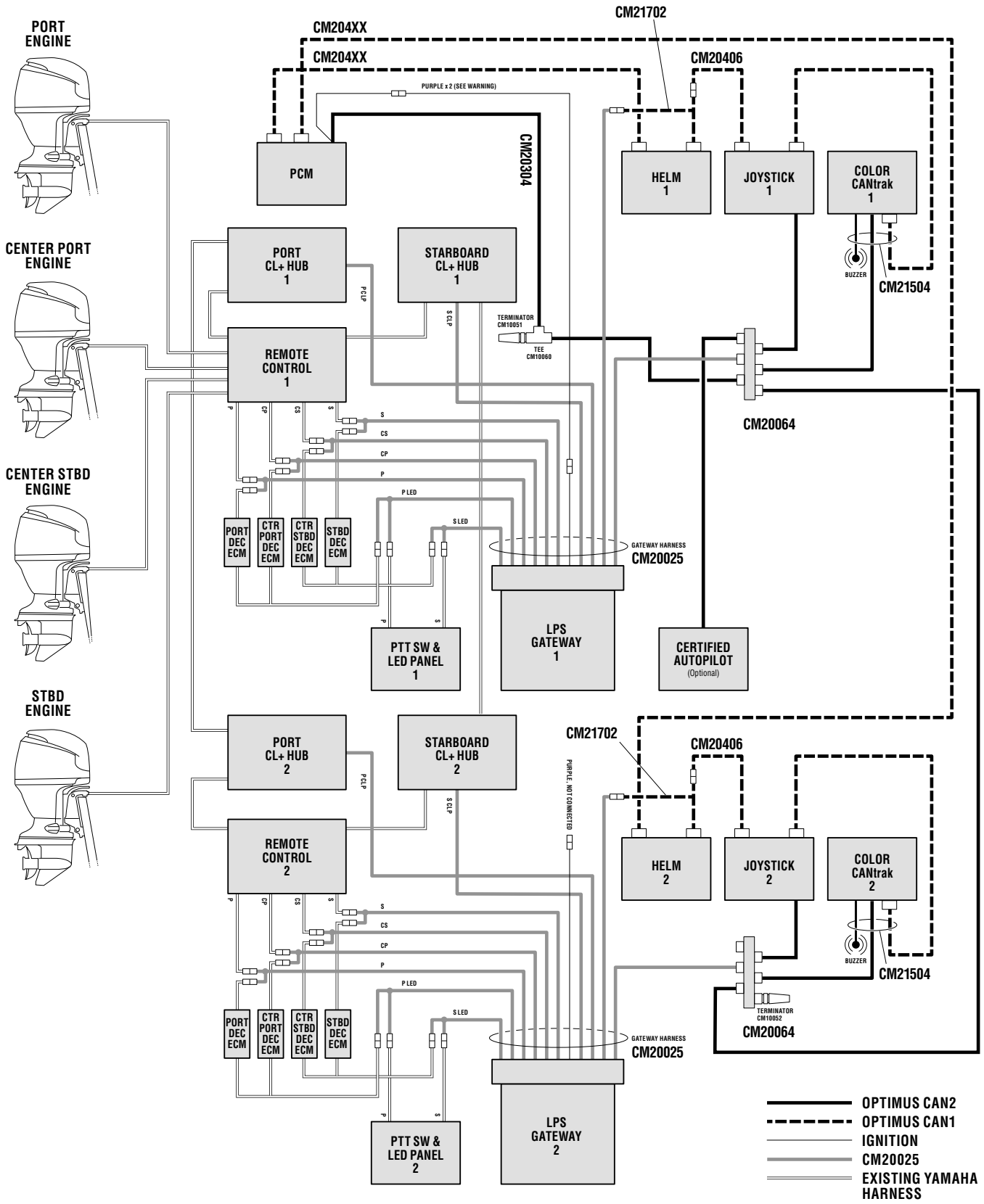
Figure 7-9. Yamaha EST – CAN2 interconnection, dual station, twin engine (with preferred CAN1 cabling).



WARNING!

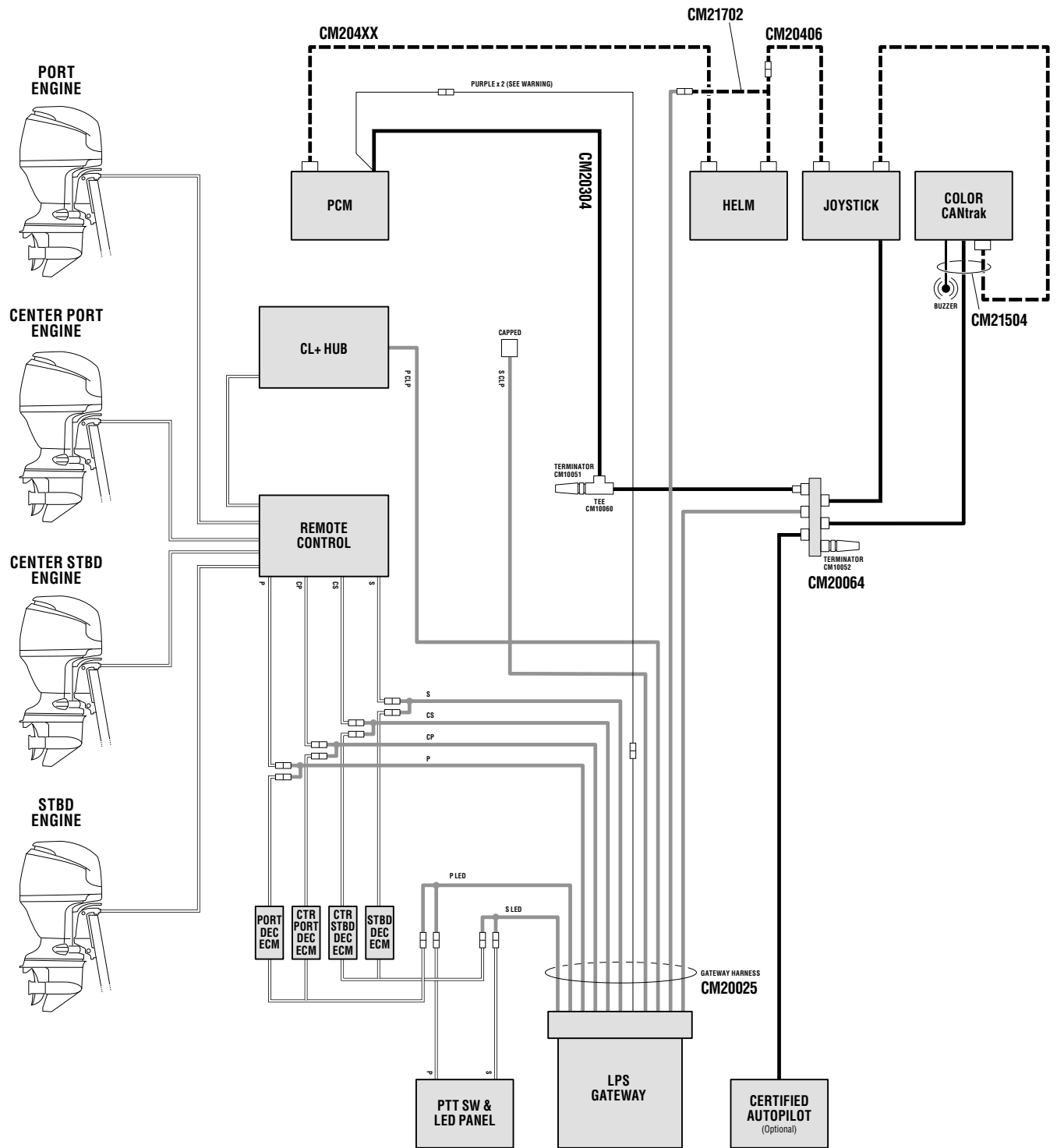
Avoid steering failure. Ensure proper ignition connections per Optimus EPS installation manual.

Figure 7-10. Yamaha EST – single station, quad engine, Generation 1.



WARNING!
 Avoid steering failure. Ensure proper ignition connections per Optimus EPS installation manual.

Figure 7-11. Yamaha EST – dual station, quad engine, Generation 1.



WARNING!
 Avoid steering failure. Ensure proper ignition connections per Optimus EPS installation manual.

Figure 7-12. Yamaha EST – single station, quad engine, Generation 2 remote control.

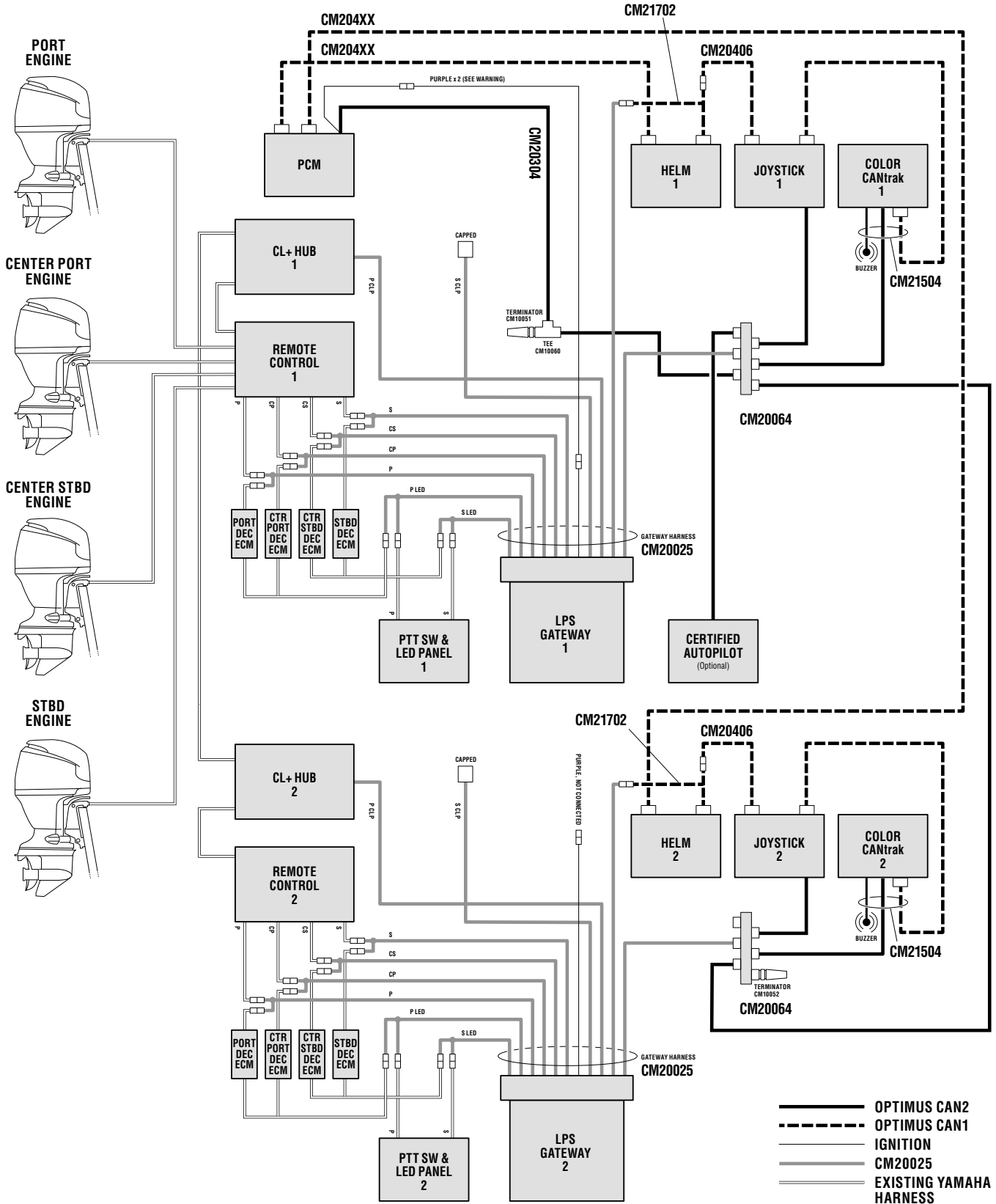


Figure 7-13. Yamaha EST – dual station, quad engine, Generation 2 remote control.

7.2 Yamaha EX

The Yamaha EX shift and throttle system connects to the Optimus 360 system through the EST Gateway, using the harness CM20046. The gateway in turn connects to the Optimus 360 CAN1 and CAN2 networks, and the Yamaha Command Link Plus network. Optimus 360 supports twin and triple engine applications for boats with single or dual helm stations, however only one joystick may be installed on the vessel. An EST gateway is only required at the main station.

7.2.1 Yamaha EX remote control connection

The EST Gateway harness (CM20046) connects to the black connector at the remote control binnacle. The control head has black and grey connectors that are illustrated in the figures that follow. The Yamaha EX control head and harnesses are the same for twin and triple configurations.

1. Ensure the power is switched off to the system.
2. On the underside of the Yamaha EX control head, locate and disconnect the black connector as per figure 7-14.



NOTE

It is not possible to mix up the grey and black connectors because they are keyed differently.

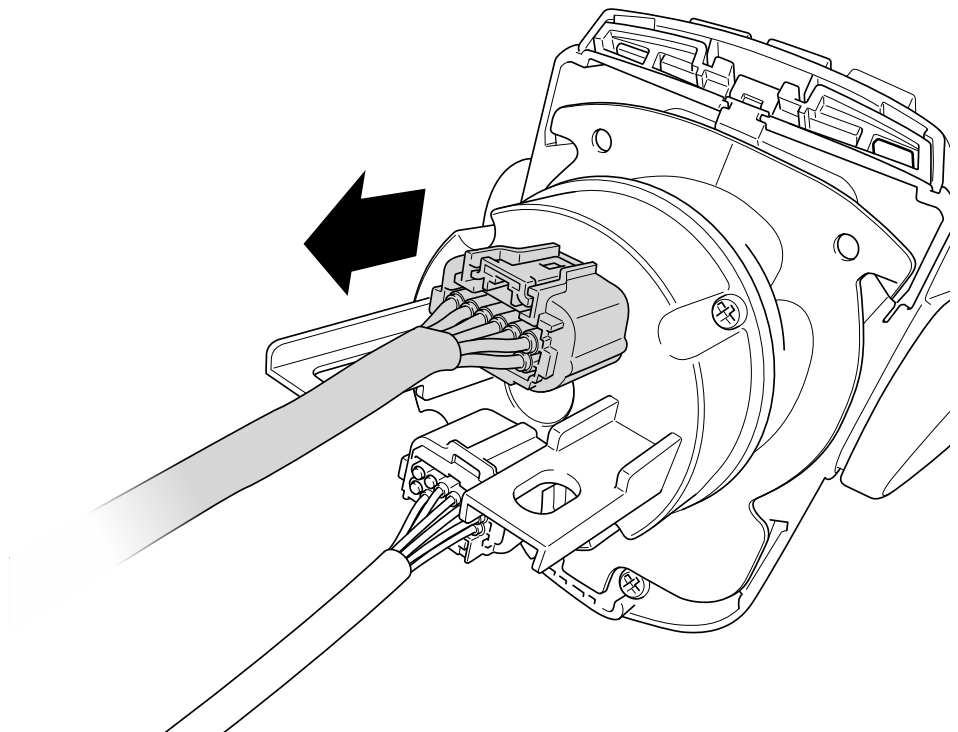


Figure 7-14.

3. Connect the EST gateway harness between the Yamaha EX control head and Yamaha EX control harness.
4. Re-install the control head in the dash.

7.2.2 EST gateway installation for Yamaha EX



NOTICE!

The Yamaha EX EST gateway harness does not have ignition/wake-up lines for the PCM.

Ignition lines for the PCM should remain connected to the Yamaha key accessory switch.

The EST gateway is an electronic interface device that connects the Optimus control system to the OEM shift and throttle control system. It passes shift and throttle commands from the joystick to the engine manufacturer's EST system, and monitors station selection, network status and ignition state.

Location

A gateway (EG1860) and joystick may only be installed at the main station control head of the vessel. The gateway should be installed underneath the dash and as close as practical to the control head. Before installation, test fit with harness CM20046 to ensure that the harness connects to the remote control and the gateway without strain.

Installation

Install the gateway with the strain relief plate and screws as shown in figure 7-15. The preferred orientation is vertical with connections facing down, but it may also be installed horizontally. Avoid mounting the gateway with the connections facing upwards.

Use cable ties to secure the harness cables to the strain relief plate as shown in figure 7-16.

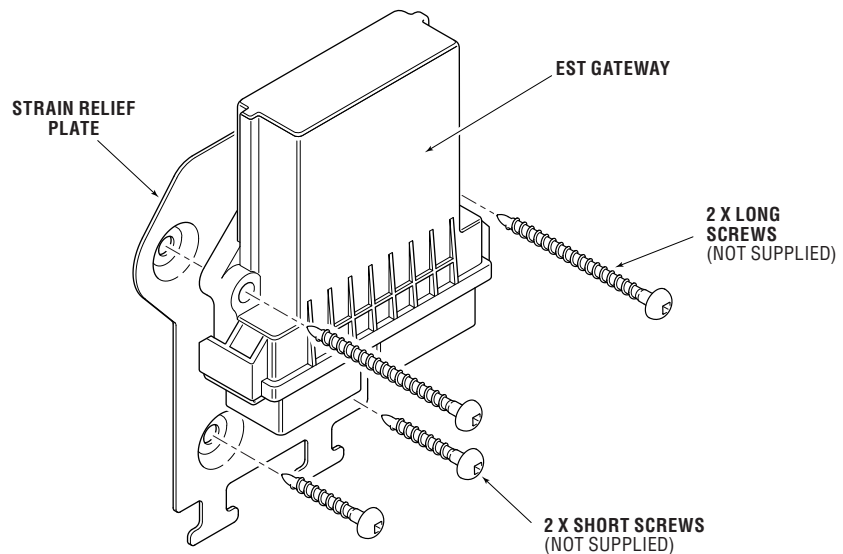


Figure 7-15. Harness connection to EST gateway.

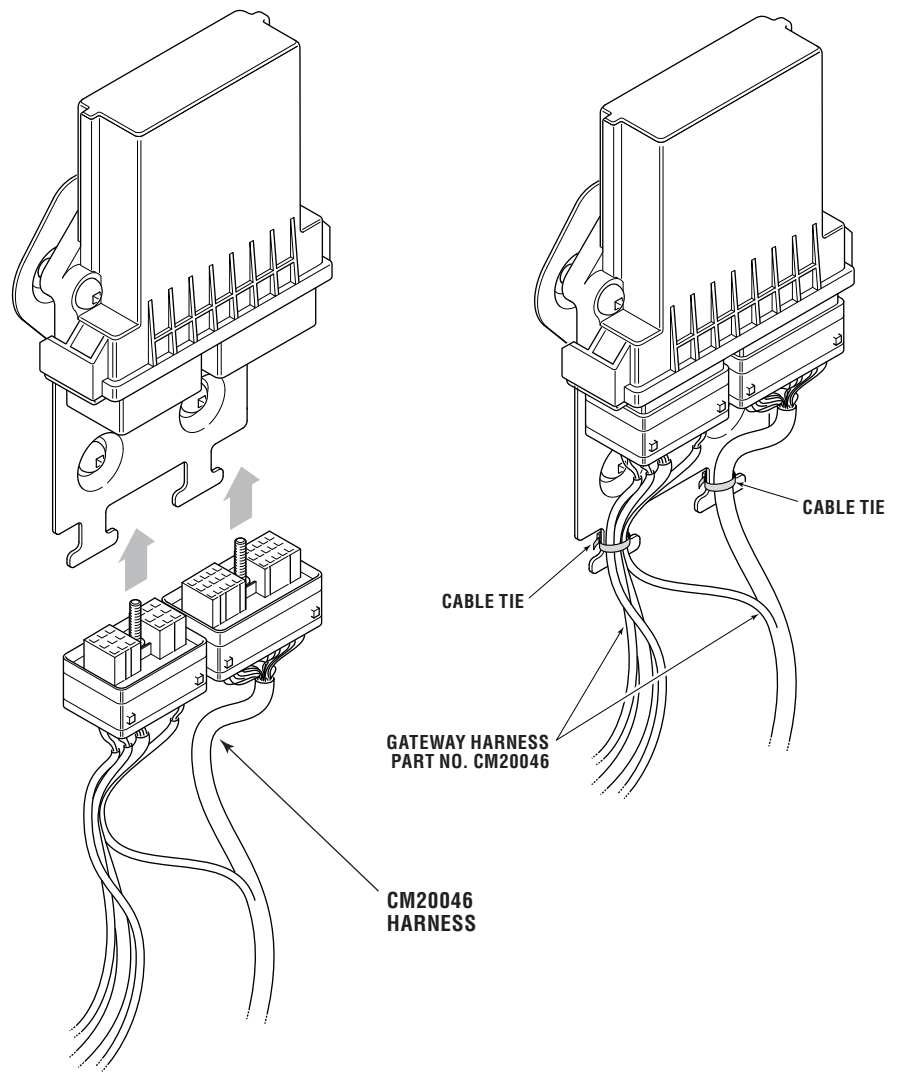


Figure 7-16. Harness connection to EST gateway.

7.2.3 Yamaha EX EST gateway and Optimus 360 connection

The Yamaha EX shift and throttle system connects to the Optimus 360 system through the EST Gateway, using the harness CM20046. The gateway in turn connects to the Optimus 360 CAN1 and CAN2 networks, and the Yamaha Command Link Plus network.



NOTE

Figure 7-17 shows the interconnections for a single station implementation. In twin station applications, a joystick may only be installed at the main station. Although figure 7-17 shows a twin engine configuration, the Optimus and gateway connections are identical for a triple engine boat. You may need to add additional Command Link Plus hubs if there is no port available to connect the gateway harness. Refer to the Yamaha documentation for part numbers.



WARNING!

All harness runs should be sufficiently bundled and strain relieved to avoid accidental damage.

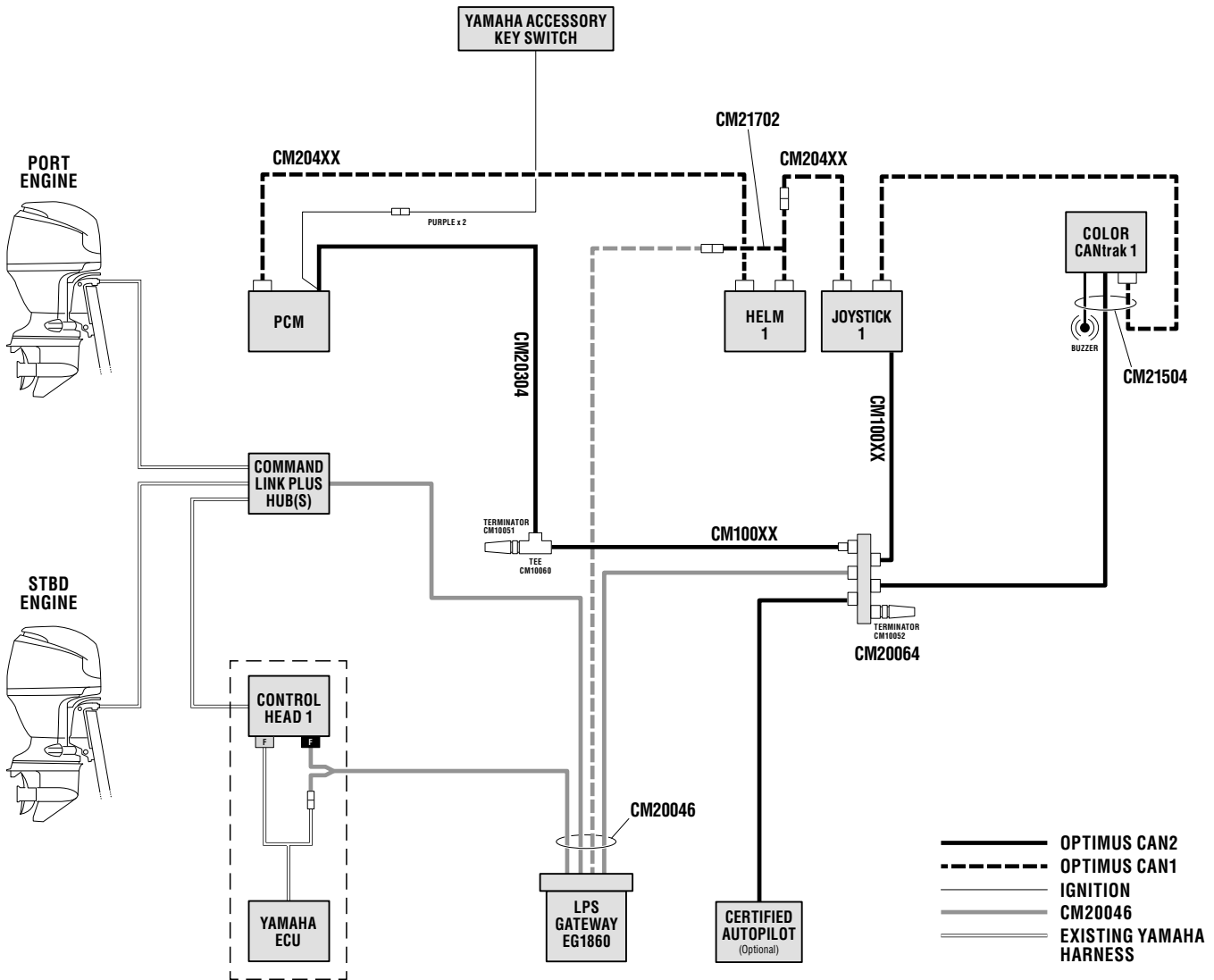


Figure 7-17. Yamaha EX – single station, twin engine.

The Yamaha EX EST gateway harness does not have purple ignition leads. The Optimus EPS system's purple wires will be connected to the Yamaha accessory key switch. When the Yamaha accessory key switch ignition is applied, the Optimus EPS and EST gateway will be powered.

7.3 Yamaha EST gateway setup

Before configuring the EST gateway you should have already conducted the initial system setup described in section 4.

If you have more than one control station you will need to configure each gateway separately, as they need to be calibrated to their adjacent remote control. The calibration wizard records the output values from the remote control's lever position sensors (LPS) at various lever positions.

The gateway calibration is performed easily with the CANtrak display.

Procedure

1. The gateway calibration must be performed with the engines keyed on, but not running. Check the RPM reading on the color CANtrak and the Yamaha display. Both should read 0 RPM at all engines. If the RPM displays as '---' on the CANtrak, check your speed source connections.
2. At the main station CANtrak, navigate to **Dealer Menu > Initial Setup > EST Gateway** to bring up the EST Gateway Setup screen. If you have two gateways, and have correctly set the number of gateways in section 4, then you will also see a 2nd station gateway on your screen.

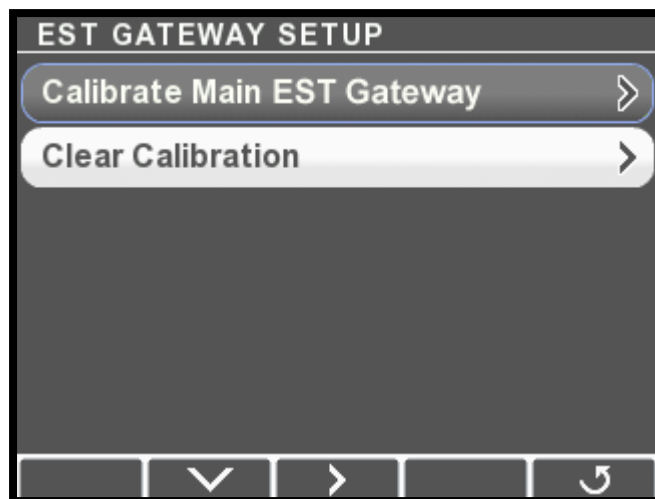


Figure 7-18.

3. Select **Calibrate Main EST Gateway** and press **>**. This will put the main station gateway into calibration mode.

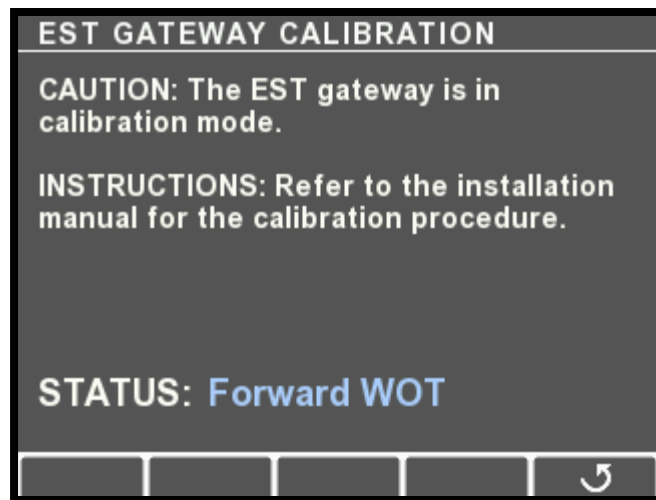


Figure 7-19.

- 4.** The status indication will guide you through the calibration steps. Move both control levers to the position indicated in the status field. You will be directed in turn through the following:
 - a. Forward WOT – move the levers to the forward throttle stops
 - b. Forward detent – engage forward gear with levers in idle position
 - c. Neutral – put both levers in neutral
 - d. Reverse detent – engage reverse gear with levers in idle position
 - e. Reverse WOT – move levers to the reverse throttle stops
- 5.** After the final calibration step the wizard will exit automatically.
- 6.** Repeat the calibration wizard from the second station, if applicable.

8 Mercury DTS

To complete the system installation for a Mercury DTS engine:

1. Connect the gateway harness to the Mercury DTS remote control (section 8.1).
2. Install the Optimus EST gateway (section 8.2)
3. Complete the CAN1, CAN2 and CAN3 network connections (refer to figure 8-3 and figure 8-4).
4. Calibrate the gateway (section 8.3)

Once you've completed these steps you can move on to sea trial (Book 65) and then to the joystick setup (Book 65).

The EST Gateway harness (CM20038) connects to the Lever Position.

Sensor (LPS) connection on the underside of the Mercury DTS control head. These connections are illustrated in the figure 8-1 and figure 8-2. Although a twin-engine remote control is shown, the connections are identical for a triple or quad engine control.

8.1 Mercury DTS remote control connections

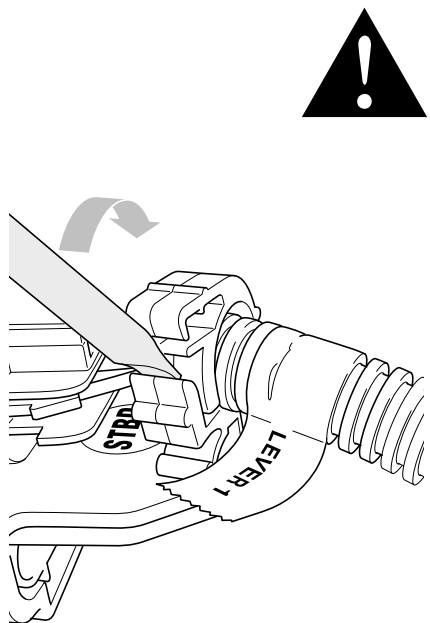


Figure 8-1.



WARNING!

There must be one gateway per Mercury control head. Failure to comply may cause loss of steering control, property damage, personal injury and/or death.

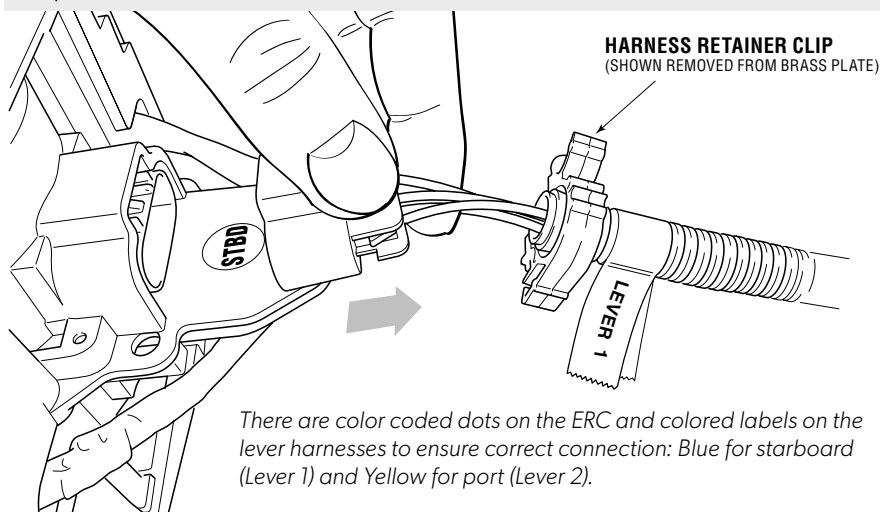


Figure 8-2.

1. Open the harness retainer clips, located on the underside of the Mercury DTS control head (see figure 8-1).
2. Disconnect the lever 1 and lever 2 Mercury DTS harnesses.
3. Connect EST Gateway's LPS harness plug labeled "**LEVER 1**" (STBD) into the "STBD" socket of the Mercury DTS control head.
4. Connect Mercury DTS "LEVER 1" plug into EST gateway's wye connector socket labeled "**LEVER 1**".

5. Close and lock the harness retainer clip, ensuring the clip is buttoned securely into the brass plate.
6. Repeat steps 3–5 for the "LEVER 2" (PORT) side.

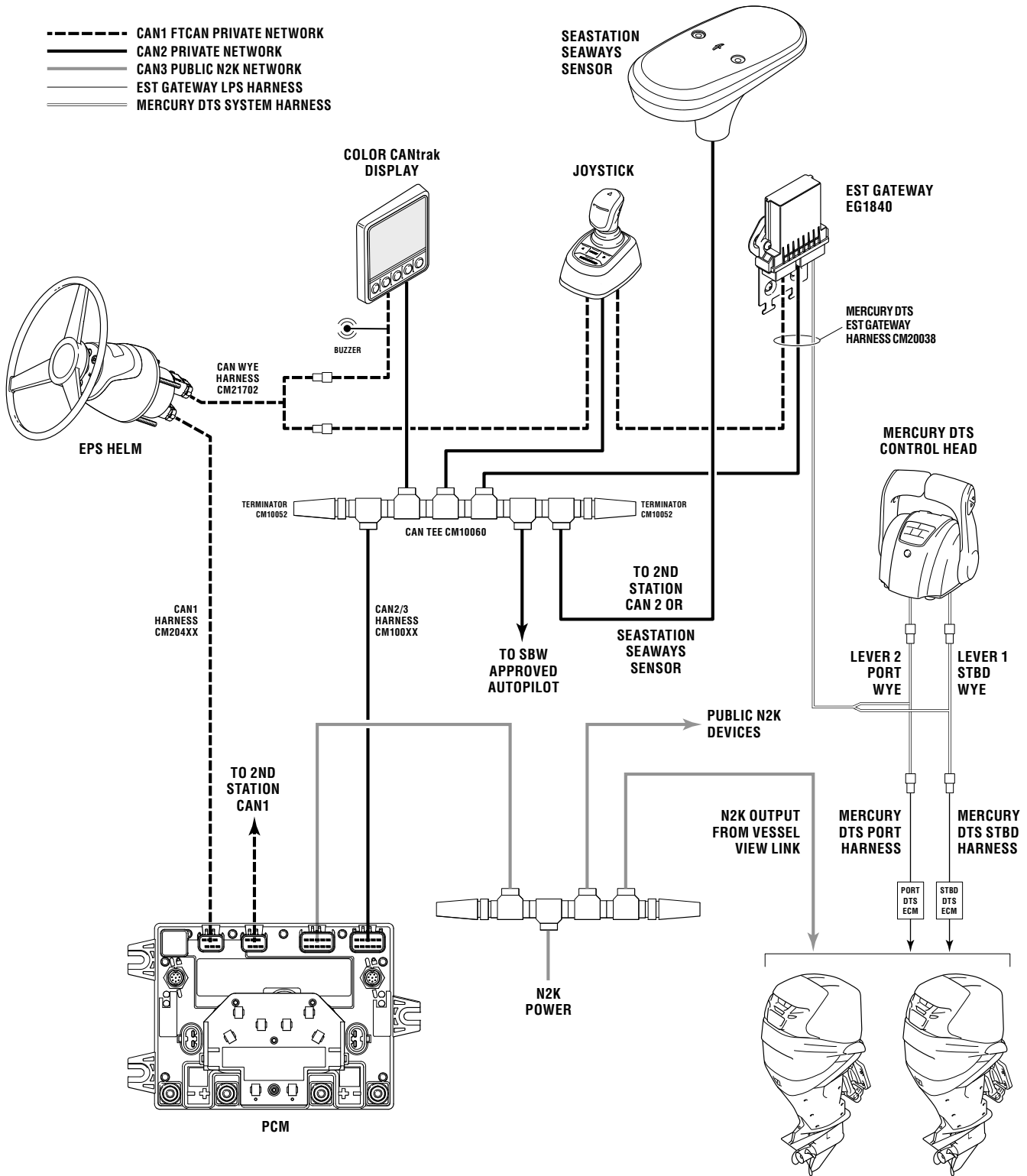
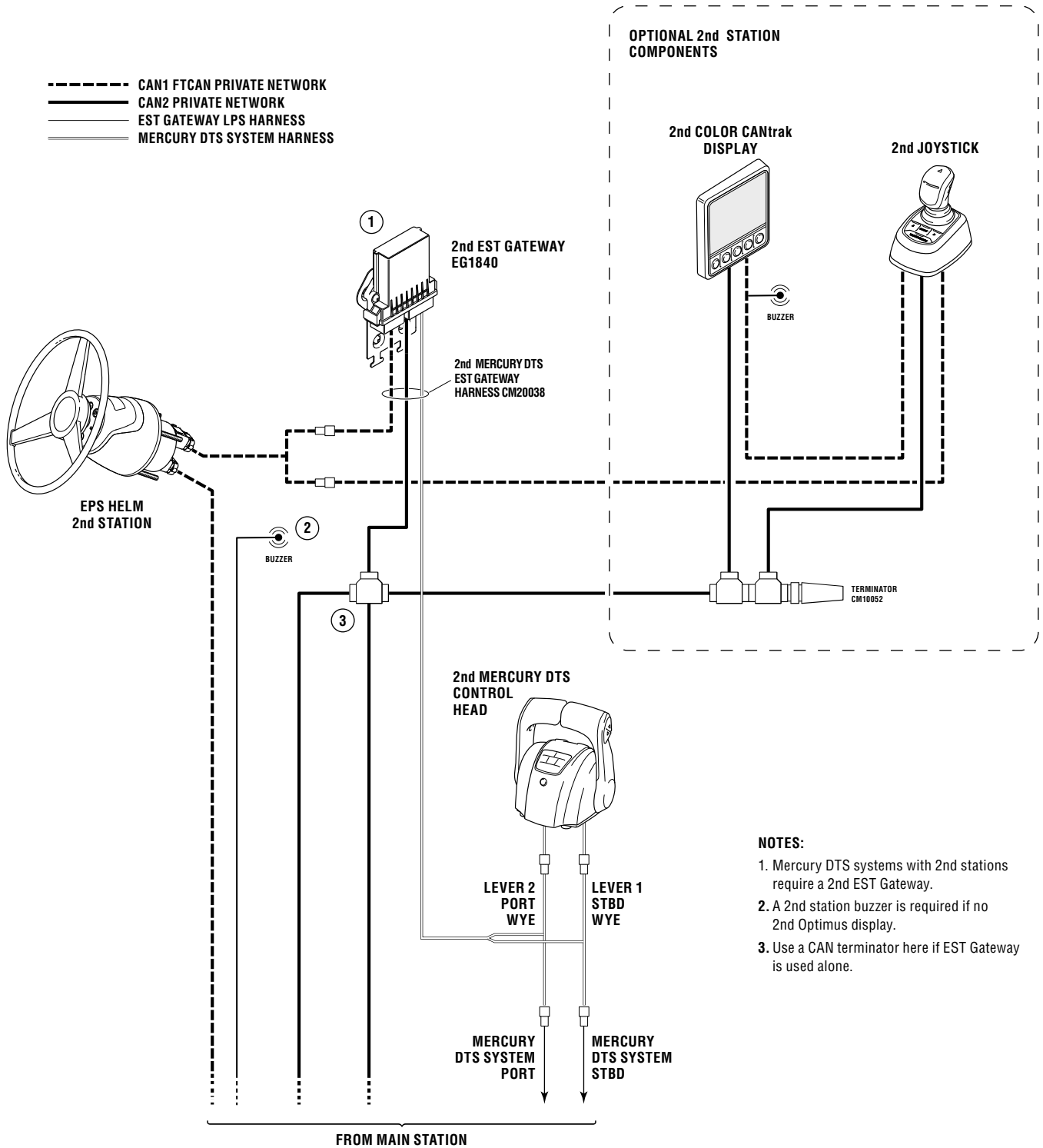


Figure 8-3. Mercury DTS – single station, twin engine.



NOTICE!

Mercury DTS systems with 2nd stations require a 2nd EST Gateway.

Figure 8-4. Mercury DTS – Optional second station.

8.2 EST gateway installation



NOTICE!

The Mercury DTS EST gateway harness does not have ignition/wake-up lines for the PCM.

Ignition lines for the PCM should remain connected to the Mercury accessory relay terminal block(s).

The EST gateway is an electronic interface device that connects the Optimus control system to the OEM shift and throttle control system. It passes shift and throttle commands from the joystick to the engine manufacturer's EST system, and monitors station selection, network status and ignition state.

Location

A gateway (EG1840) is required at each control station if the vessel is equipped with a joystick. This is true if the vessel only has one joystick. It should be installed underneath the dash and as close as practical to the control head. Before installation, test fit with harness CM20038 to ensure that the harness connects to the remote control and the gateway without strain.

Installation

Install the gateway with the strain relief plate and screws as shown in figure 8-5. The preferred orientation is vertical with connections facing down, but it may also be installed horizontally. Avoid mounting the gateway with the connections facing upwards.

Use cable ties to secure the harness cables to the strain relief plate as shown in figure 8-6.

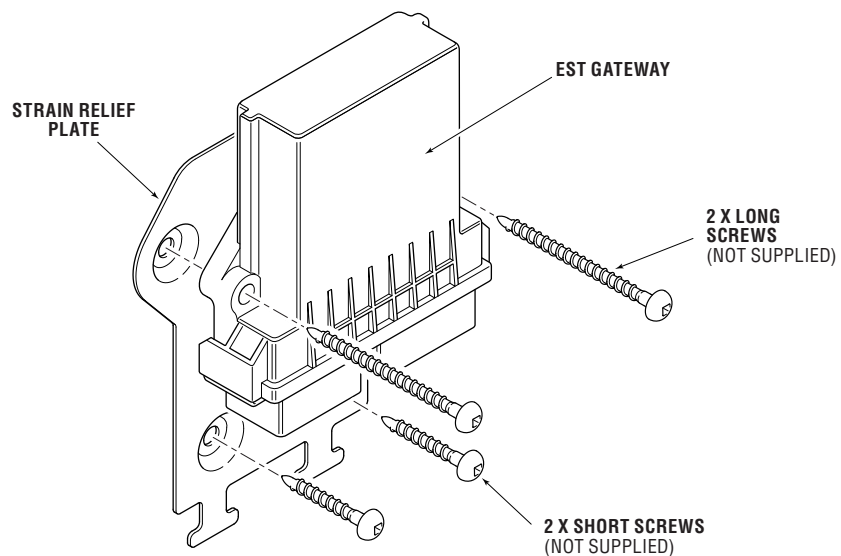


Figure 8-5. Gateway with strain relief plate.

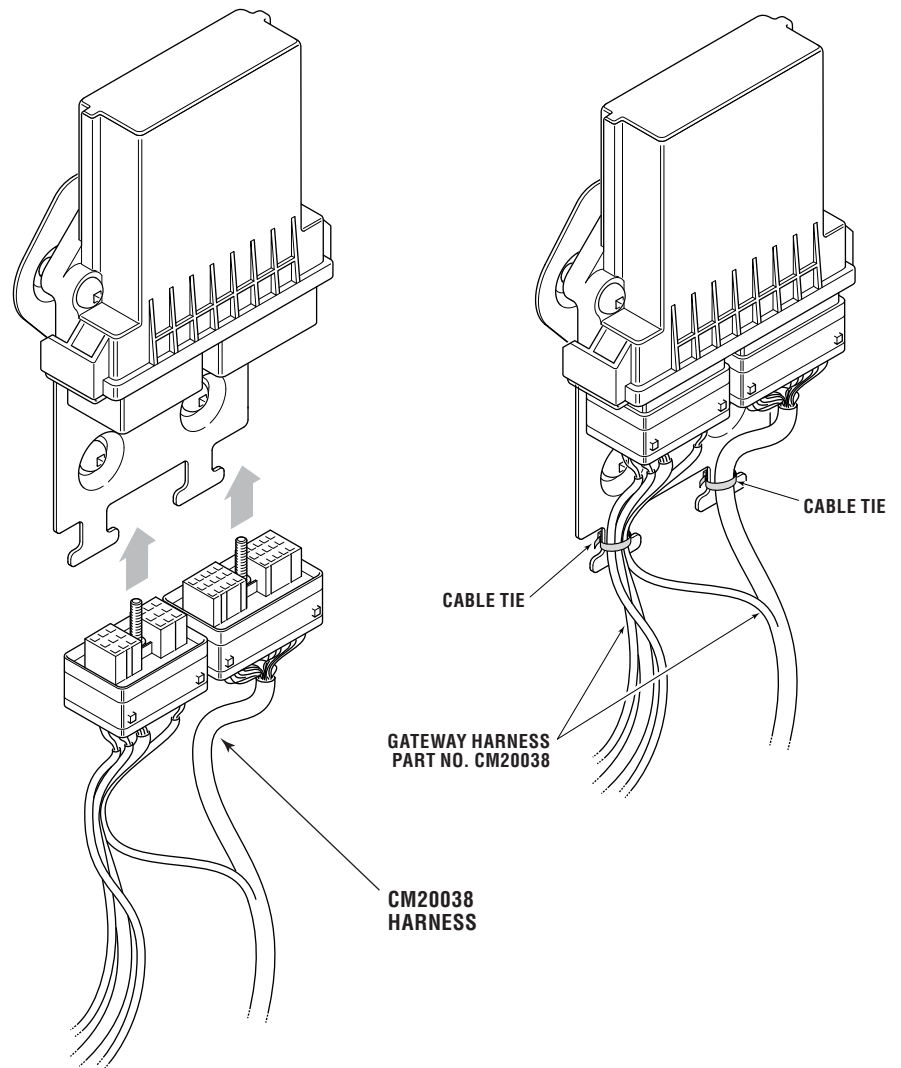


Figure 8-6. Harness connection to EST gateway.

8.3 Mercury DTS/EST gateway setup

Before configuring the EST gateway you should have already conducted the initial system setup described in section 4.

If you have more than one control station you will need to configure each gateway separately, as they need to be calibrated to their adjacent remote control. The calibration wizard records the output values from the remote control's lever position sensors (LPS) at various lever positions.

The gateway calibration is performed easily with the CANtrak display.

Procedure

1. The gateway calibration must be performed with the engines keyed on, but not running. Check the RPM reading on the color CANtrak. The RPM value should be 0.

If the RPM displays as '---' on the CANtrak, check your speed source connections. Take note that it can take 45 seconds for a Mercury DTS system to start broadcasting engine speed signals.

2. At the main station CANtrak, navigate to **Dealer Menu > Initial Setup > EST Gateway** to bring up the EST Gateway Setup screen. If you have two gateways, and have correctly set the number of gateways in section 4, then you will also see a 2nd station gateway on your screen.

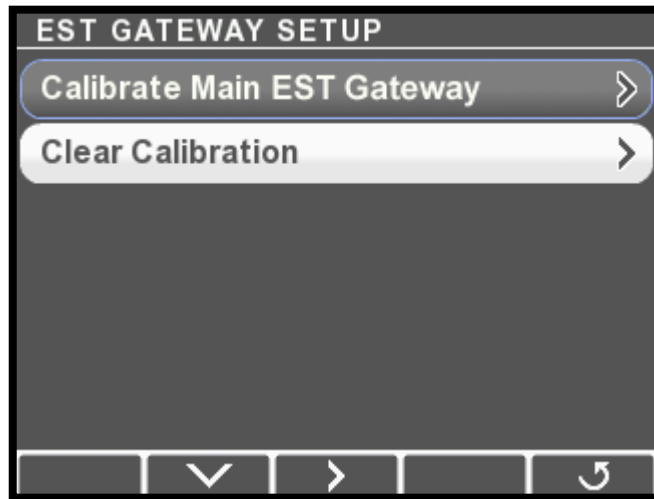


Figure 8-7.

3. Select **Calibrate Main EST Gateway** and press >. This will put the main station gateway into calibration mode.

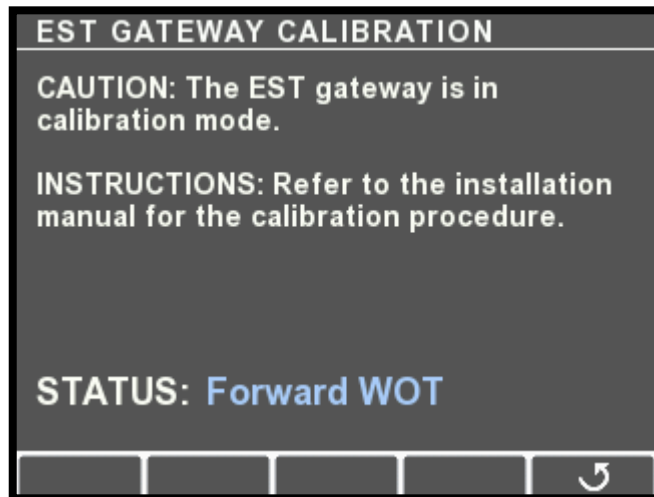


Figure 8-8.

4. The status indication will guide you through the calibration steps. Move both control levers to the position indicated in the status field. You will be directed in turn through the following:
 - a. Forward WOT – move the levers to the forward throttle stops
 - b. Forward detent – engage forward gear with levers in idle position
 - c. Neutral – put both levers in neutral
 - d. Reverse detent – engage reverse gear with levers in idle position
 - e. Reverse WOT – move levers to the reverse throttle stops
5. After the final calibration step the wizard will exit automatically.
6. Repeat the calibration wizard from the second station, if applicable.

9 Honda IST

To complete the system installation for a Honda IST engine:

1. Connect the gateway harness to the Honda IST remote control (section 9.1).
2. Install the Optimus EST gateway (section 9.3)
3. Complete the CAN1, CAN2 and CAN3 network connections (refer to figure 9-1 and figure 9-2).
4. Calibrate the gateway (section 9.4)

Once you've completed these steps you can move on to sea trial (Book 65) and then to the joystick setup (Book 65). The EST Gateway harness (CM20039) connects to the Lever Position Sensor (LPS) connections as well as analog signal harness.

These connections are illustrated in the figure 9-1 and figure 9-2.

9.1 Honda IST remote control connections

1. Carefully unplug the Honda remote control connectors for PORT LPS harness, STBD LPS harness, and switch panel harness.
2. Connect EST Gateway's LPS harness plug labeled "PORT" into Honda remote control PORT LPS connector and in turn connect EST gateway's wye connector for PORT LPS into Honda System harness for PORT LPS. Honda's LPS harness connectors are grey with red tape marking port and green tape marking starboard.
3. Repeat step 2 for the STBD LPS harnesses.
4. Carefully unplug the Honda switch panel harness and insert the EST gateway's harness wye for the switch panel into remote control and Honda system harness. Honda's switch panel harness has black connectors.

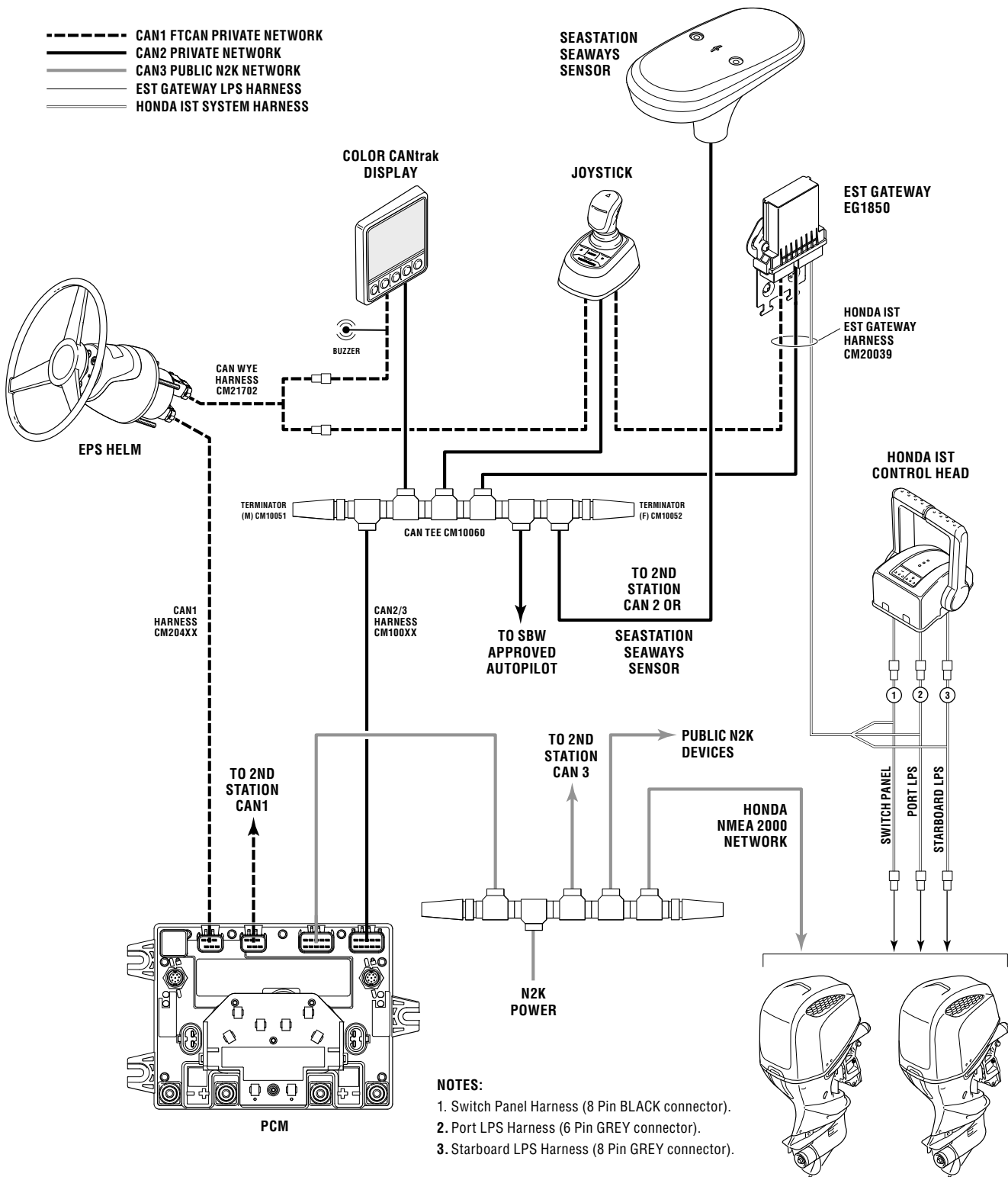


Figure 9-1. Honda IST – single station, twin engine.

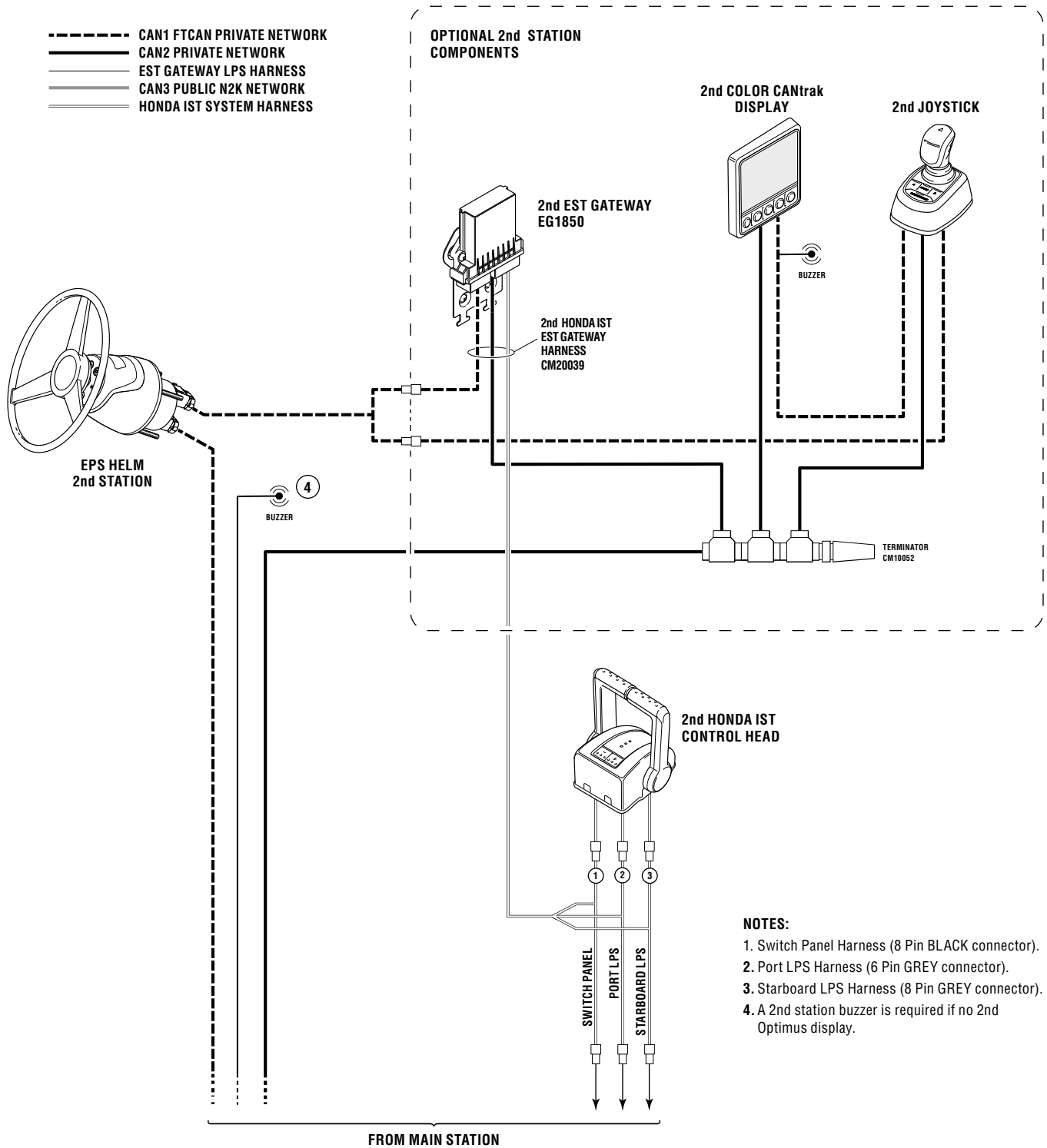


Figure 9-2. Honda IST – Optional second station.

9.2 Honda IST ignition line connection



NOTICE!

The Honda EST gateway harness does not have ignition/wake-up lines for the PCM. Ignition lines for the PCM should connect to the Honda ignition panel via the CM20040 ignition wye harness.

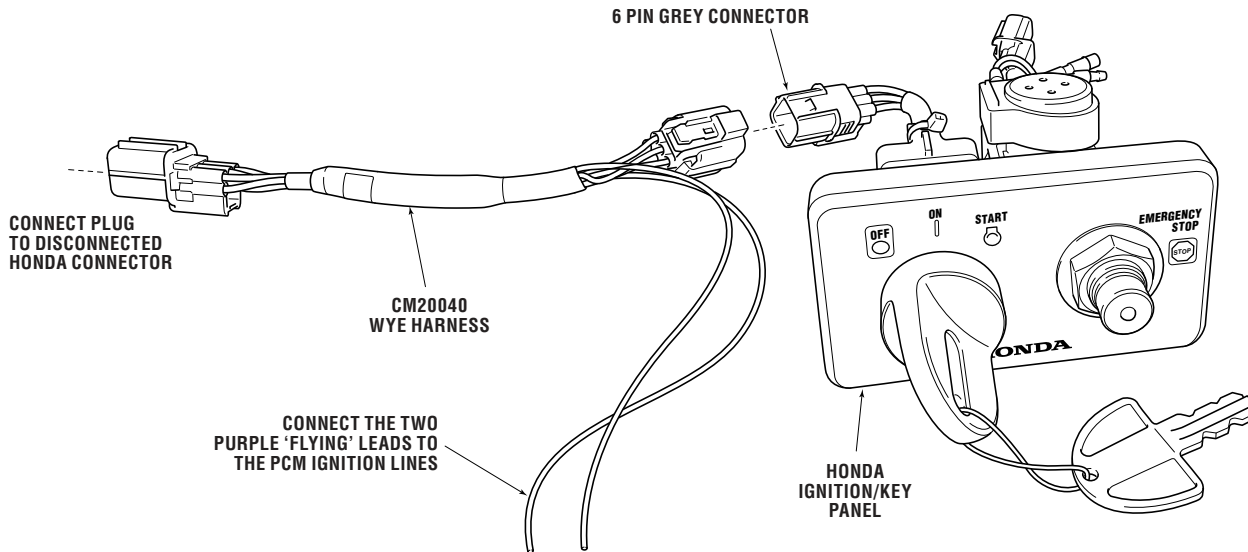


Figure 9-3. Honda IST – ignition line connection.

9.3 EST gateway installation

The EST gateway is an electronic interface device that connects the Optimus control system to the OEM shift and throttle control system. It passes shift and throttle commands from the joystick to the engine manufacturer's EST system, and monitors station selection, network status and ignition state.

Location

A gateway (EG1850) is required at each control station that is equipped with a joystick. It should be installed underneath the dash and as close as practical to the control head. Before installation, test fit with harness CM20039 to ensure that the harness connects to the remote control and the gateway without strain.

Installation

Install the gateway with the strain relief plate and screws as shown in figure 9-4. The preferred orientation is vertical with connections facing down, but it may also be installed horizontally. Avoid mounting the gateway with the connections facing upwards.

Use cable ties to secure the harness cables to the strain relief plate as shown in figure 9-5.

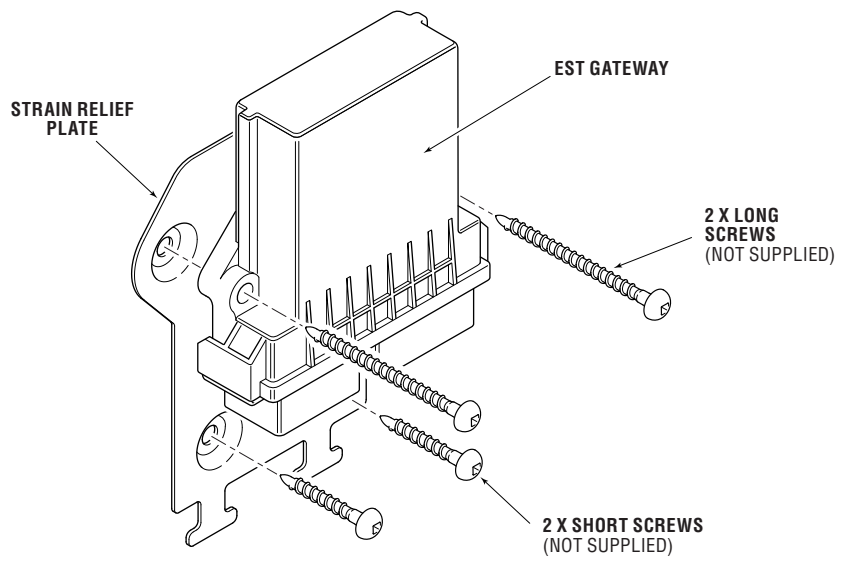


Figure 9-4. Gateway with strain relief plate.

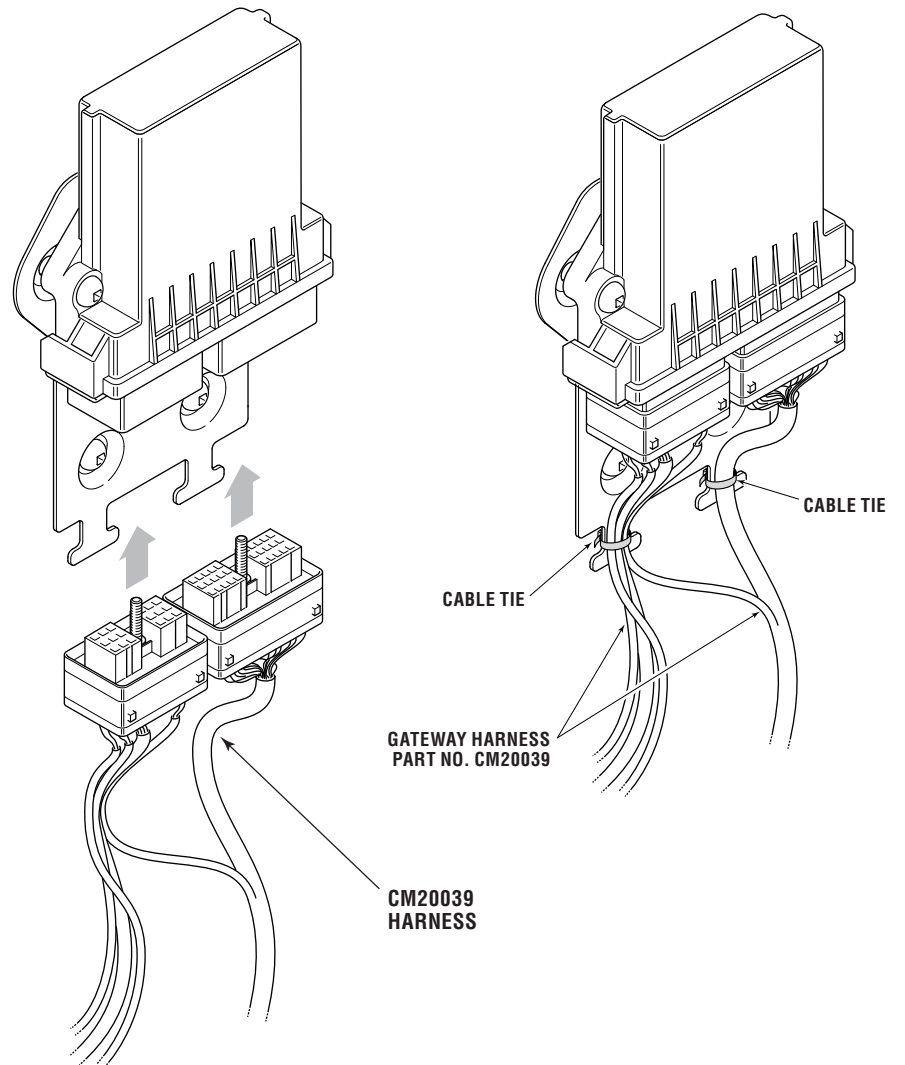


Figure 9-5. Harness connection to EST gateway.

9.4 Honda IST/EST gateway setup

Before configuring the EST gateway you should have already conducted the initial system setup described in section 4.

If you have more than one control station you will need to configure each gateway separately, as they need to be calibrated to their adjacent remote control. The calibration wizard records the output values from the remote control's lever position sensors (LPS) at various lever positions.

The gateway calibration is performed easily with the CANtrak display.

Procedure

1. The gateway calibration must be performed with the engines keyed on, but not running. Check the RPM reading on the color CANtrak. The RPM value should be 0.

If the RPM displays as '---' on the CANtrak, check your speed source connections.

2. At the main station CANtrak, navigate to **Dealer Menu > Initial Setup > EST Gateway** to bring up the EST Gateway Setup screen. If you have two gateways, and have correctly set the number of gateways in section 4, then you will also see a 2nd station gateway on your screen. Use cable ties to secure the harness cables to the strain relief plate as shown in figure 9-5.

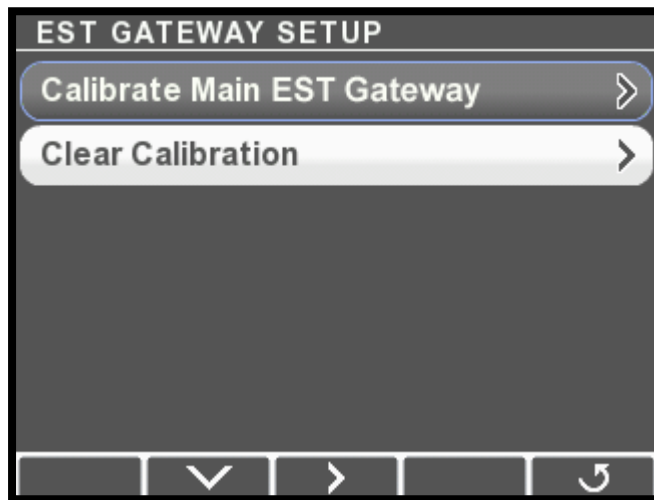


Figure 9-6.

3. Select **Calibrate Main EST Gateway** and press ➤. This will put the main station gateway into calibration mode.

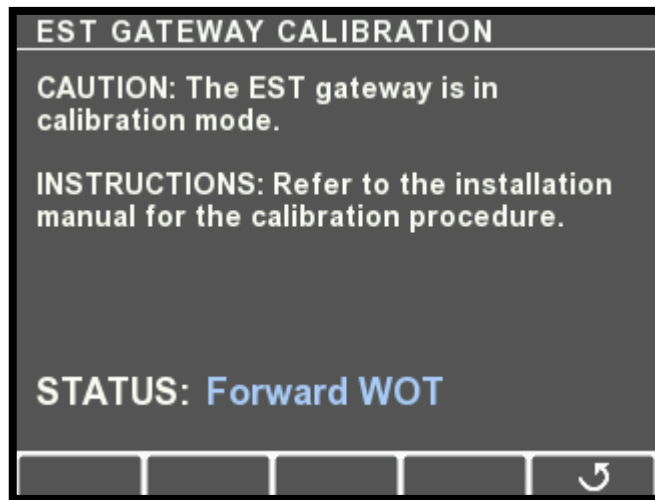


Figure 9-7.

- a. Forward WOT – move the levers to the forward throttle stops
 - b. Forward detent – engage forward gear with levers in idle position
 - c. Neutral – put both levers in neutral
 - d. Reverse detent – engage reverse gear with levers in idle position
 - e. Reverse WOT – move levers to the reverse throttle stops
5. After the final calibration step the wizard will exit automatically.
 6. Repeat the calibration wizard from the second station, if applicable.

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10 Yanmar

To complete the system installation for a Yanmar BY2/BY3 EST engine with XT sterndrive you need to:

1. Install the Optimus control head (section 10.1)
2. Complete the CAN network connections (section 10.2)
3. Set up the control head using Datalink (section 10.3)

10.1 Installing the control head

Install the control head on the dash in a location that allows convenient and unobstructed access. Whenever possible, mount the control head in a location that will minimize water spray.

Ensure that the control levers can be moved throughout their complete range of motion in both forward and reverse without interference. ABYC standard P-14 calls for a minimum of 2 1/2" (64 mm) clearance between the control lever and the steering wheel rim under all possible lever and wheel positions. A dash cutout template is provided in Appendix A.

10.1.1 Control head trim switch connection

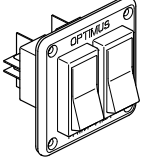
The control head includes a single trim/tilt switch on the end of the port handle. This switch can be wired to provide synchronous trim/tilt control of all engines. If independent trim/tilt is desired use tilt/trim kit HA5491 (for twin engine configurations) and connect the wiring as shown in figure 10-1.



WARNING!

All electrical connections and harness must comply with ABYC wiring standards, be rated for 105°C (221°F), and compliant with SAEJ1128.

**HA5491 DUAL ENGINE
TILT/TRIM SWITCH KIT
AVAILABLE SEPARATELY**



IF SUPPLIED BY OTHERS,
SWITCHES TO BE DP/DT,
MOMENTARY CONTACT
ON - OFF - ON

WIRE COLOR LEGEND

TRIM UP	BLUE	=====
TRIM DOWN	GREEN	=====
POWER	RED	=====

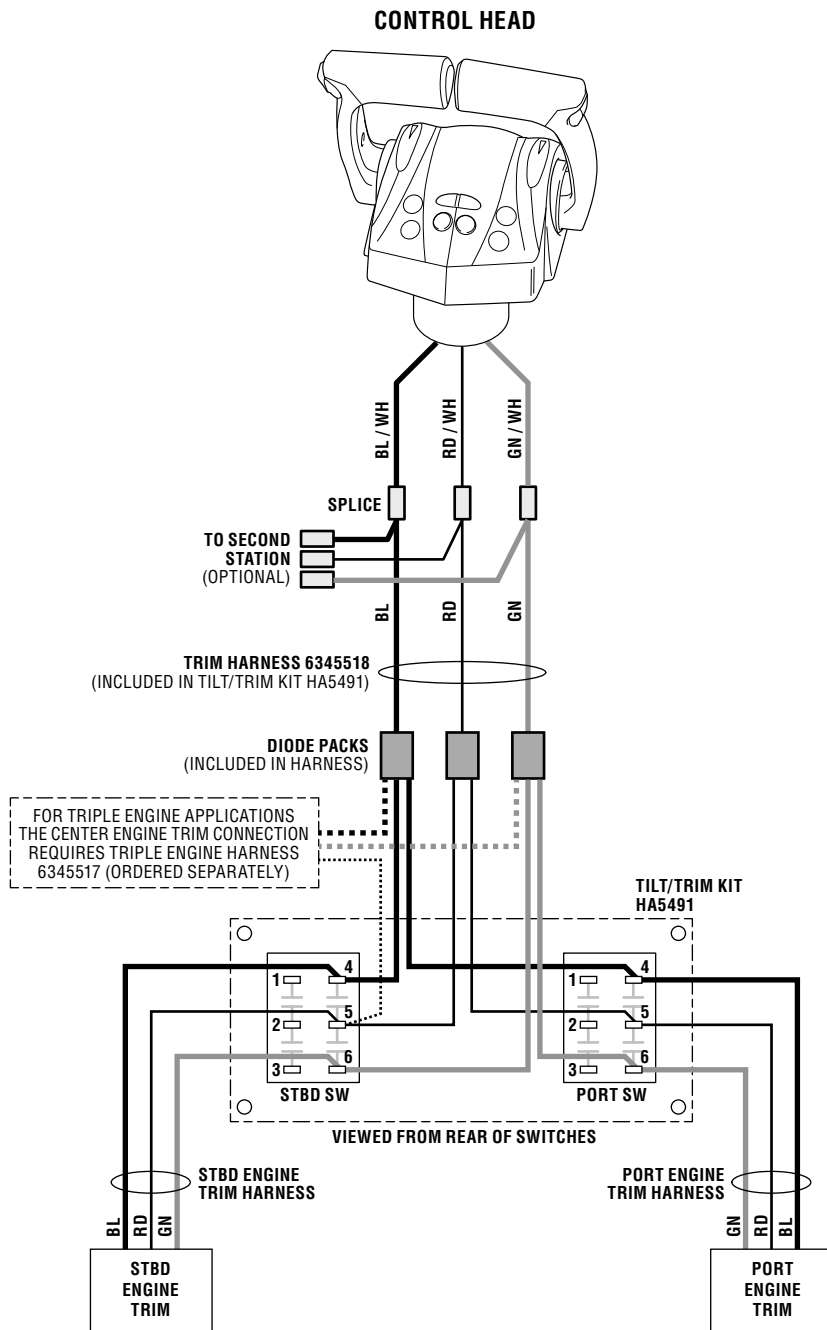


Figure 10-1. Independent trim switch wiring.

10.2 Yanmar and Optimus 360 CAN2 interconnection

The Yanmar BY2/BY3 shift and throttle system and the Optimus 360 system communicate over the CAN2 network. The interconnection is made by connecting the Yanmar CE10803 harness to the Optimus CAN2 network at a hub or tee. See figure 10-2 and figure 10-3 for detailed interconnection schematics.

The NMEA 2000 backbone shown in figure 10-2 and figure 10-3 has a 12 Volt power connection. If there is an existing NMEA 2000 network already powered do not make this 12 V connection. Check NMEA 2000 network architecture and ensure correct backbone termination.

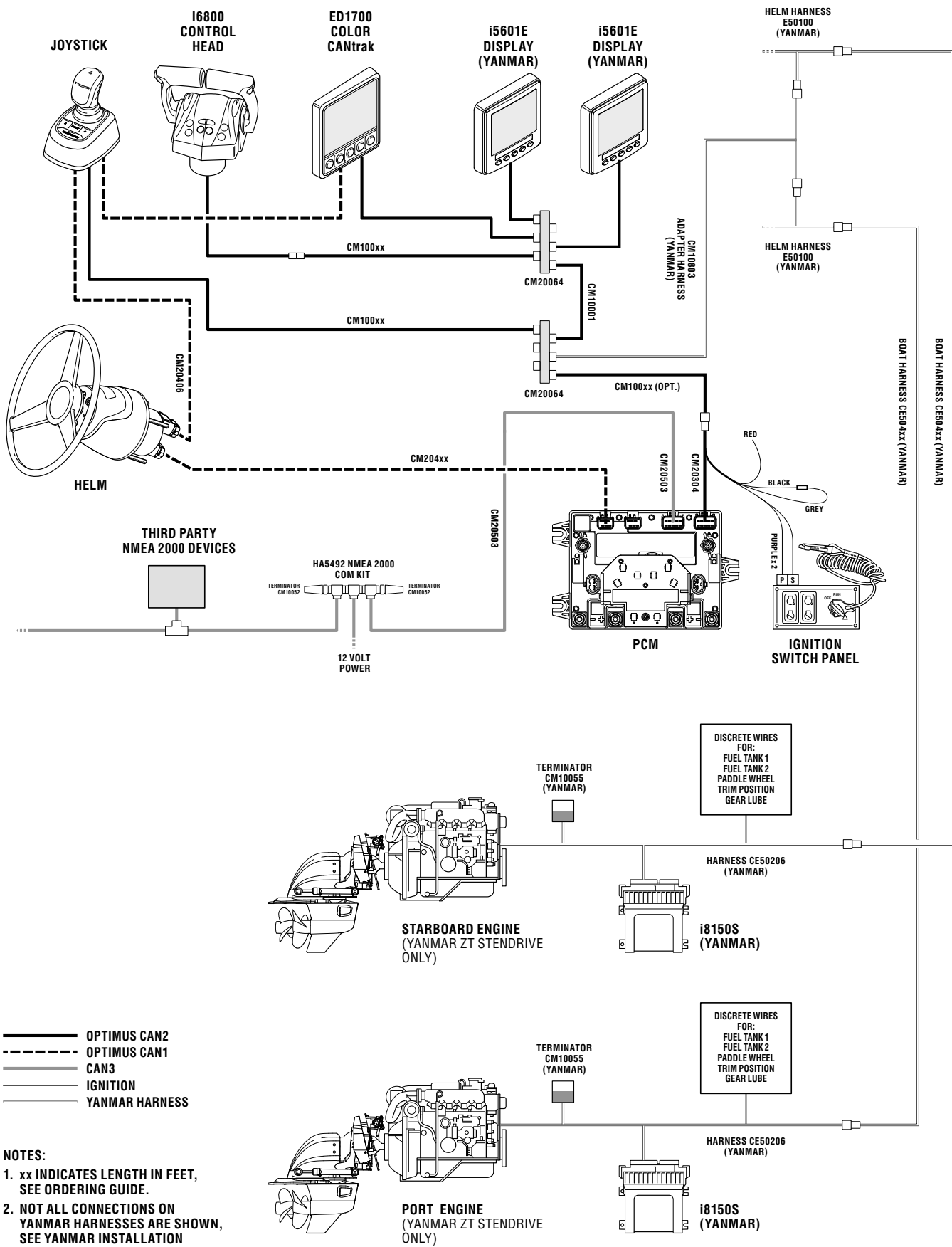


Figure 10-2. Yanmar CAN wiring diagram. (PCM mounted forward.)

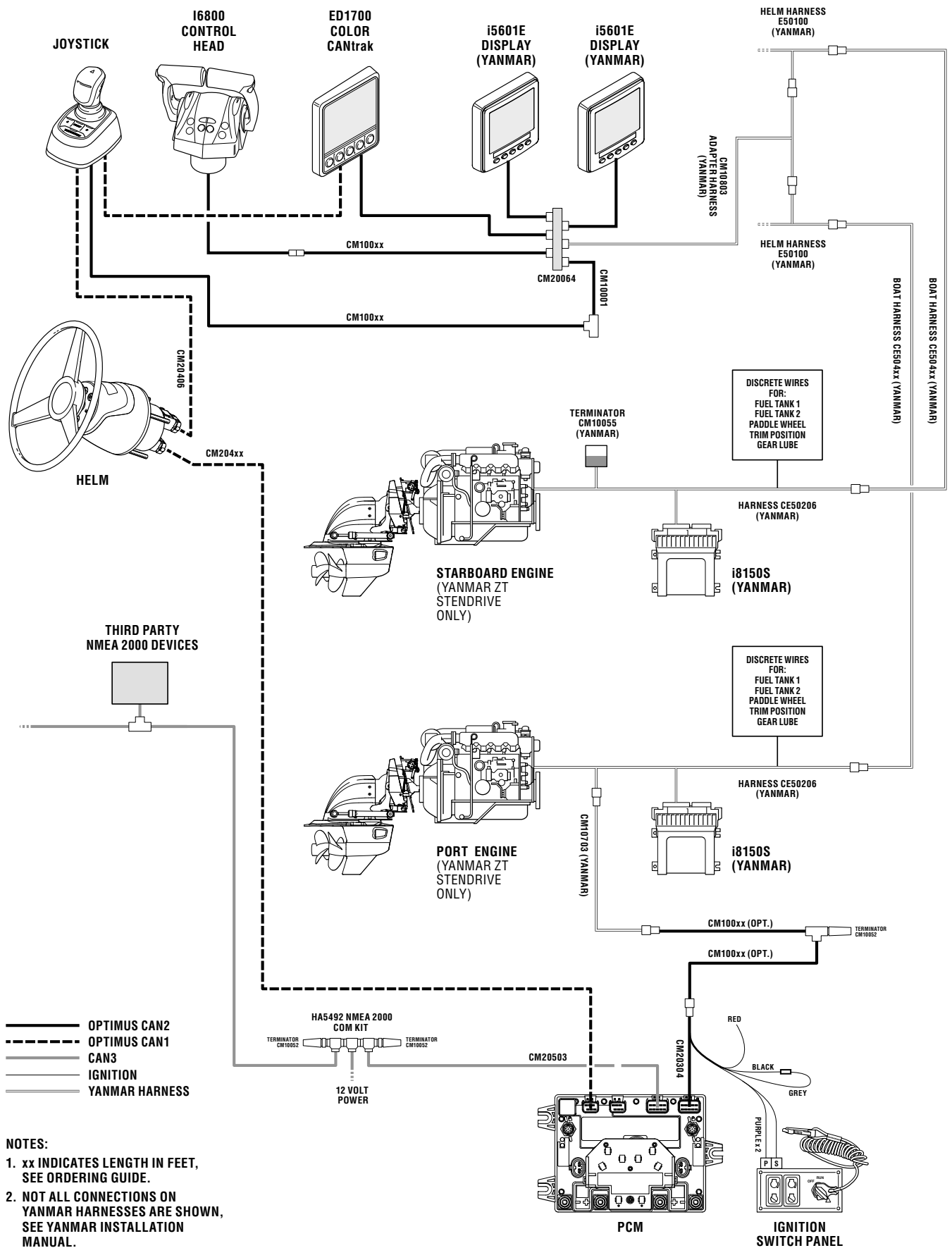


Figure 10-3. Yanmar CAN wiring diagram. (PCM mounted aft.)

10.3 Control head setup

The Yanmar control head has several configurable parameters, as shown in figure 10-4 below. The default settings will generally provide excellent performance for most boats.

To access the parameters, navigate to **Dealer Menu > Settings > Shift & Throttle** on your CANtrak display.

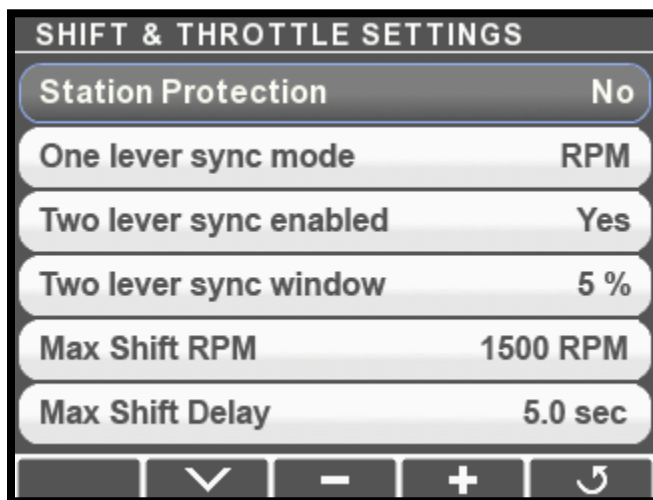


Figure 10-4. Control head setup.

Station protection

This feature prevents accidental switching between control stations on multi-station boats by requiring a specific sequence of button presses on the control head. The Optimus 360 User's Manual (Book 62) has more information about this feature.

One Lever Sync mode

Controls the throttle behavior when the Power Train Sync (PTS feature is engaged. When set to RPM the control system will use engine RPM feedback to match engine speeds. When set to Throttle the control system will simply match the throttle command.

Two Lever Sync enabled

When Two Lever Sync is enabled the control system will synchronize engine speeds when both levers are in close to the same position.

Two Lever Sync window

This parameter sets the maximum throttle difference for which Two Lever Sync will function.

Max. shift RPM

Sets the maximum RPM at which a gear shift will be attempted by the control head. It is designed to delay a shift until engine RPM reaches a safe shifting speed.

Max. shift Delay

When there is no engine RPM source present the control software uses a time delay to prevent shifting while engine speed is too high. The Max parameter represents the shift delay (in seconds) if the control lever has been at 100% throttle for some time and is rapidly moved to another gear. In operation the shift delay is reduced in proportion to the amount of throttle commanded. We recommend that you leave this parameter at the default of 5 seconds, but if you find the shifting is sluggish you can reduce this parameter in small increments.

FWD/REV throttle curve

There are two throttle curves that control the response characteristics when the control lever is at or near idle. Curve 1 is the default curve, and is suitable for most applications. Curve 2 requires more lever travel before throttle is increased.

**FWD/REV trolling
max. throttle**

Sets the maximum percentage of wide open throttle when trolling mode is engaged. A forward setting of 50% means that when the throttle lever is fully forward the throttle is limited to 50% of maximum. This provides greater throttle sensitivity when moving at slow speeds.

TECH TIP

You are now ready to sea trial the steering system. Refer to book 65. When the sea trial is complete, proceed to the joystick setup in book 65.

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11 OXE

To complete the system installation for an OXE EST engine you need to:

1. Install the OXE control head (refer to installation instructions provided by OXE)
2. Complete the CAN network connections (11.1)

11.1 OXE and Optimus 360 network interconnection

The OXE shift and throttle system and Optimus 360 system connect together through the CAN2 network. CAN3 is used to broadcast system information to a public NMEA2000 network.

1. CAN2 connects to the OXE E-CAN network. This network should already be adequately terminated with two terminating resistors. Do not add more terminating resistors.
2. CAN3 connects to the NMEA2000 instrumentation network.
3. PCM ignition is connected to the key-on ignition switch panel.

Complete the CAN network as shown in figure 11-1.

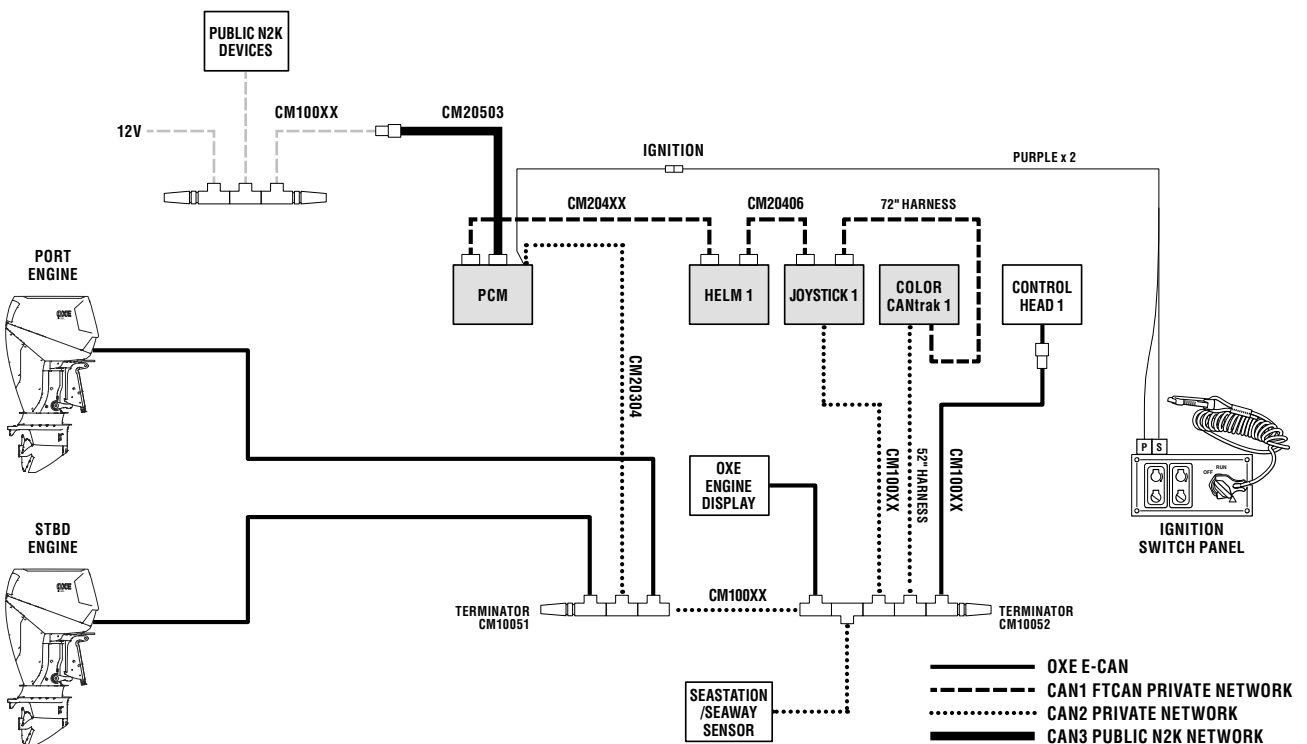


Figure 11-1.

Setup the system as instructed in Book 65. When prompted to select a Shift and Throttle type, select i7700.

12 Post-Installation Warranty Checklist

After completion of the system installation, configuration and initial Sea Trial, the Post-Installation Warranty Checklist supplied with your system documentation must be filled out and returned to Dometic as part of the Limited Warranty Registration. Failure to fill out the form or incomplete information may result in loss of warranty coverage.

13 Updating Firmware

From time to time it may become necessary to update the component firmware as new versions become available.

Refer to section 11.0 of the Optimus EPS Installation Manual (Book 65) for instructions.

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14 Warranty

14.1 Statement of limited warranty

We warrant to the original retail purchaser that **Marine Canada Acquisition Inc. DBA SEASTAR SOLUTIONS** (herein forward referred to as SeaStar Solutions) products have been manufactured free from defects in materials and workmanship. This warranty is effective for two years from date of purchase, excepting that where **SeaStar Solutions** products are used commercially or in any rental or income producing activity, then this warranty is limited to one year from the date of purchase.

We will provide replacement product without charge, for any **SeaStar Solutions** product meeting this warranty, which is returned (freight prepaid) within the warranty period to the dealer from whom such product were purchased, or to us at the appropriate address. In such a case **SeaStar Solutions** products found to be defective and covered by this warranty, will be replaced at **SeaStar Solutions'** option, and returned to the customer.

The above quoted statement is an extract from the complete **SeaStar Solutions** products warranty statement. A complete warranty policy is available in our **SeaStar Solutions** products catalogue.

For more information please visit our website:

www.seastarsolutions.com/support-2/warranty-2/seastar-solutions-warranty

14.2 Return goods procedure

Contact our warranty department at Marine.Warranty@dometic.com for instructions.

14.3 Technical support

Phone: 604.248.3858

email: seastar@dometic.com

Hours: Monday to Friday 05:00 – 15:30 PST

14.4 Authorized service centers and distributors

For a current listing of all our authorized service centers and distributors please visit our website: www.dometic.com

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Appendix A – Mounting Templates

A.1 Joystick



CAUTION!

The helm may effect a ship's or the autopilot's compass. For less than one degree of effect keep the EPS helm and the compass a minimum of 8 inches (20.5 cm) apart.

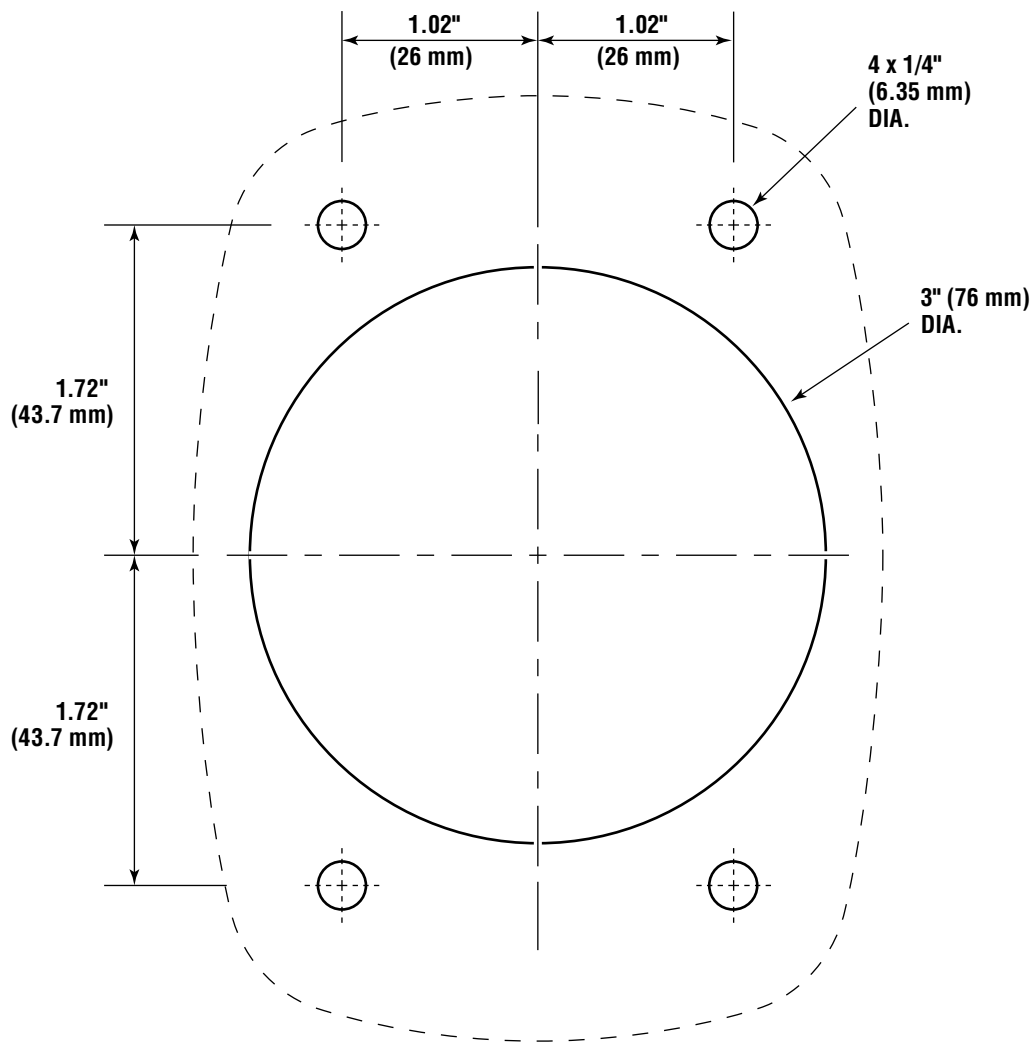


Figure A-1. Joystick Mounting Template.



NOTICE!

If you must photocopy this mounting template for use, check ALL measurements using a measuring device prior to using as a template.

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A.2 Control head (Yanmar/Optimus)



CAUTION!

The helm may effect a ship's or the autopilot's compass. For less than one degree of effect keep the EPS helm and the compass a minimum of 8 inches (20.5 cm) apart.

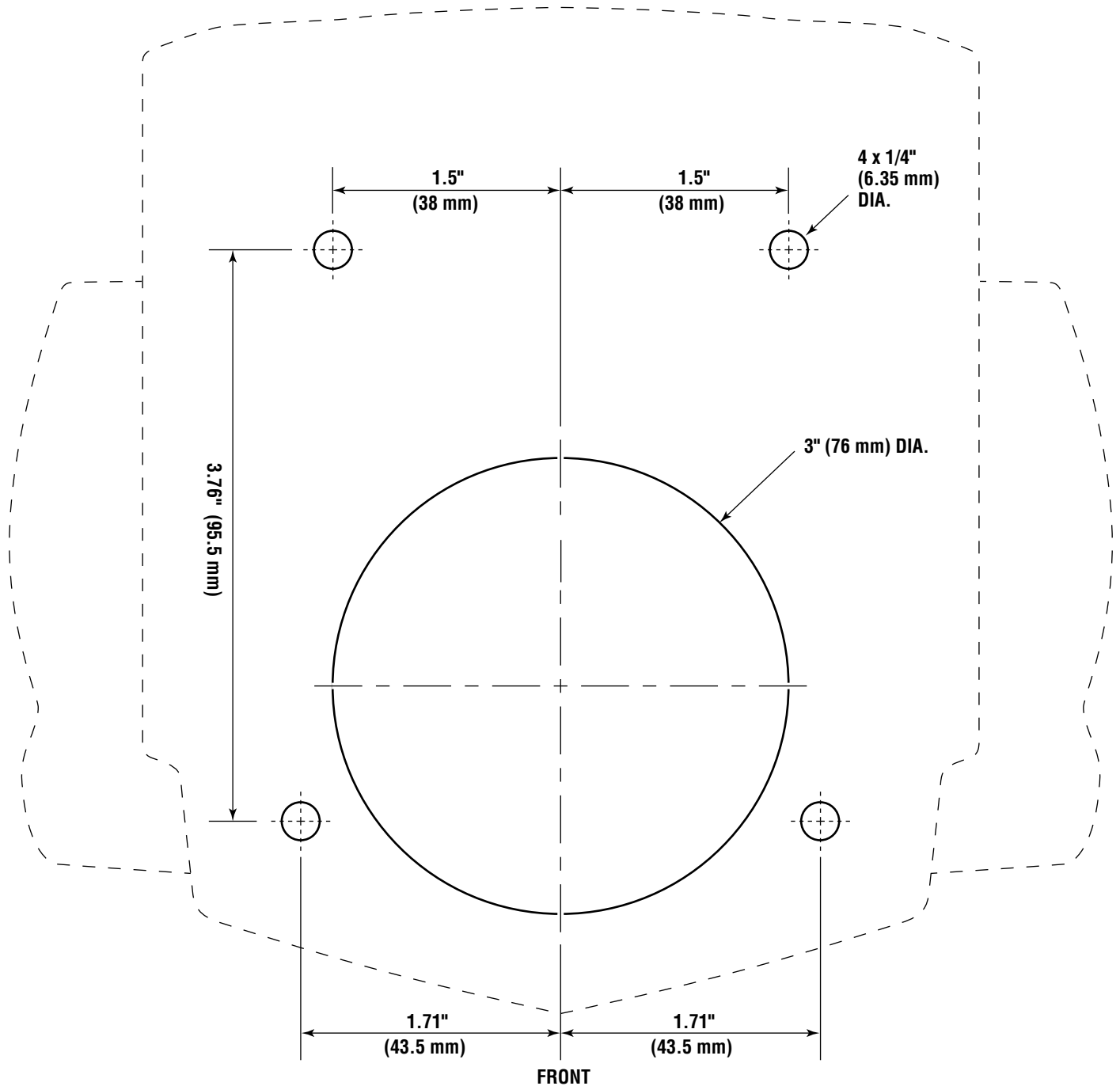


Figure A-2. Control Head Mounting Template.



NOTICE!

If you must photocopy this mounting template for use, check ALL measurements using a measuring device prior to using as a template.

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Appendix B – Setup and Tuning with Datalink

B.1 Using Datalink

The Optimus 360 uses the same Datalink dealer setup program as the standard Optimus EPS system. However, in order to communicate with the vessel command components the computer must be connected to the system via the CAN2 network rather than the CAN1 connection outlined in the Optimus EPS manual. The CAN2 programming cable (P/N CM21106) is provided in the Optimus dealer kit.



NOTICE!

Always make sure the latest version of Datalink is installed and in use. Check www.optimusportal.com for latest program revision.

Procedure

1. Connect the notebook computer to an unused CAN2 network port using the CAN2 programming harness as shown in figure B-1. If necessary an additional tee may be installed but must be removed or capped after use. If the spare tee is left in the system, there must still be one (and only one) terminator at each end of the CAN2 bus.
2. Turn on the notebook computer and open the Datalink program located on the desktop.
3. Once Datalink opens, the Interfaces section of the workspace should become populated with components connected to the network. If not, double click on Optimus CAN2 in the protocols section. The components should turn green as communication is established.
4. Double-clicking on any of the components will enter the configuration pages for that particular component.
5. Before proceeding with setup, verify that the firmware revisions are up to date for each of the components. Refer to section 11.0 of the Optimus EPS Installation Manual (Book 65) for instructions on checking and updating firmware revisions.

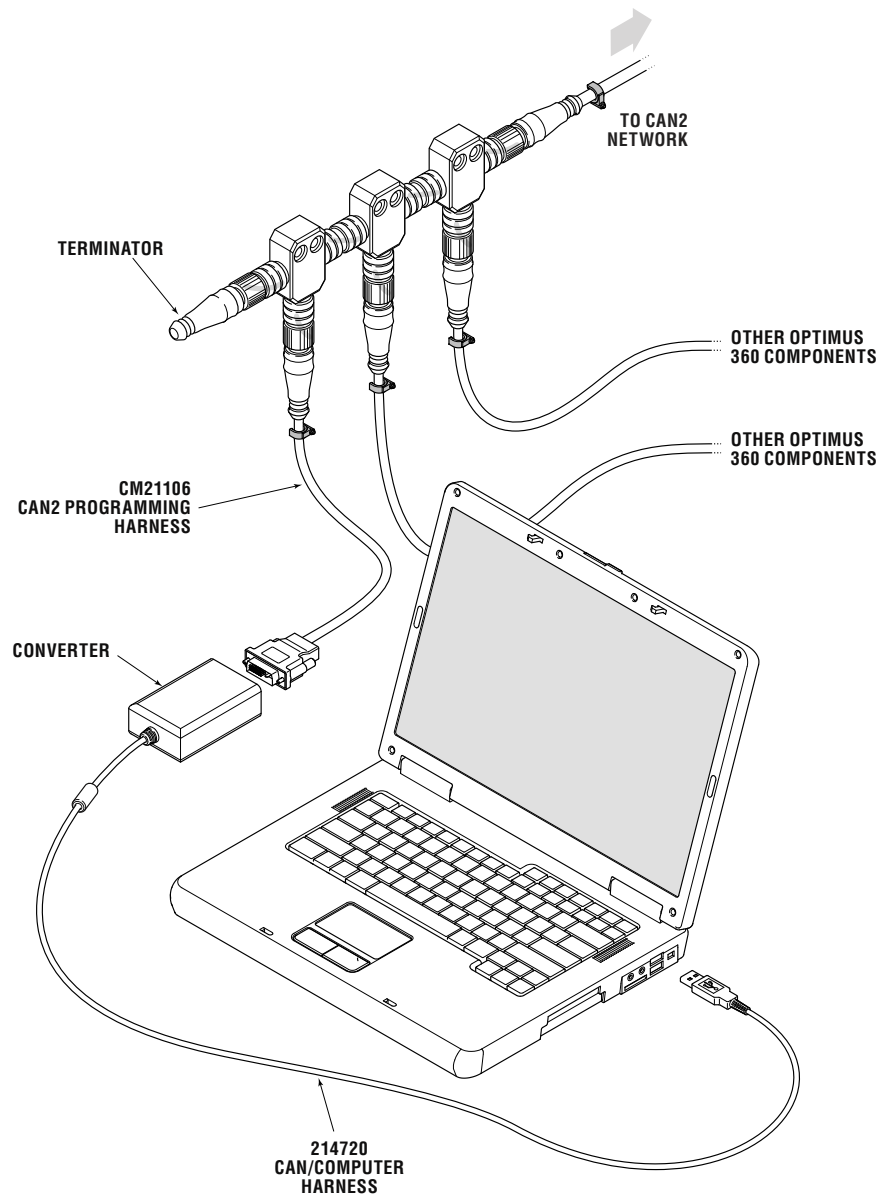


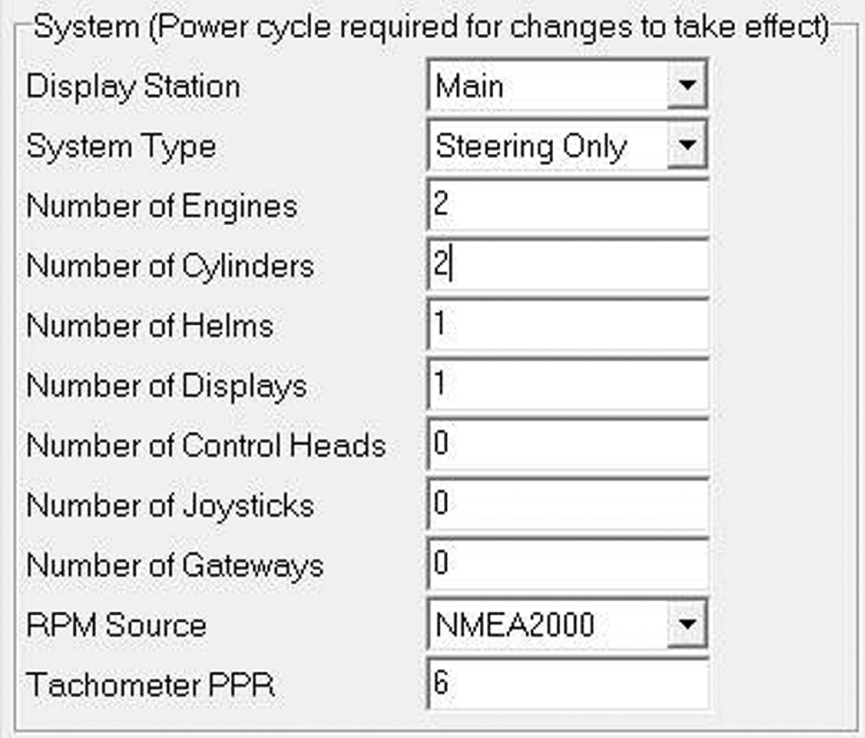
Figure B-1. Dealer kit connection.

B.2 System setup

Basic system configuration is set through the color CANtrak display parameters. The display then broadcasts these settings to all the system devices connected to the network.

Access the parameters by double-clicking on Main Color Display in the Datalink workspace, then clicking on the Configuration tab. Remember to click **Write** after making any changes.

B.2.1 System parameters



System (Power cycle required for changes to take effect)	
Display Station	Main
System Type	Steering Only
Number of Engines	2
Number of Cylinders	2
Number of Helms	1
Number of Displays	1
Number of Control Heads	0
Number of Joysticks	0
Number of Gateways	0
RPM Source	NMEA2000
Tachometer PPR	6

Figure B-2. Color display – System parameters.

Display station	Set the instance of the display. The default is Main; you only need to change the second station display instance.
System Type	Set the appropriate system type from the drop-down list.
Number of Engines	At the time of printing only twin engine configurations are supported, except on Yamaha DEC systems, for which triple-engine configurations are supported.
Number of [component]	Enter the quantity of each listed component in your system.
RPM Source	Set to Electronic Engines.
Tachometer PPR	Not applicable

B.2.2 Settings menu access

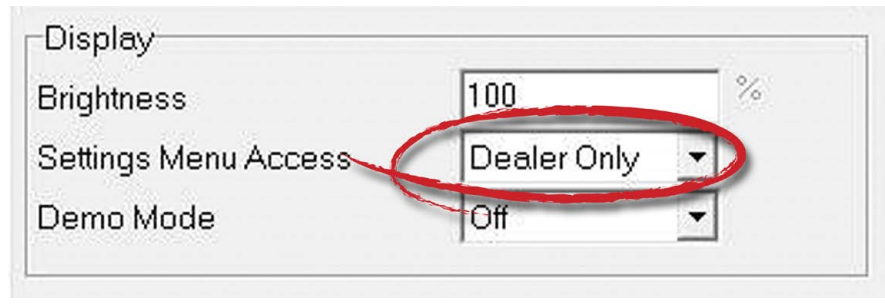


Figure B-3. Display parameters.

The adjustable steering settings are limited to those with Dealer Menu access by default. To allow users to adjust the steering settings, change the Settings Menu Access parameter to 'All'.

B.2.3 Cycle power to system

Changes to system parameters will not take effect until the power has been cycled.

To cycle power, turn the key off for several seconds and turn it on again

B.3 Joystick tuning procedure

The joystick setup procedure is organized into ten steps, detailed in the following sections. You will perform the majority of the procedure from the Setup tab (and its three sub-tabs) of the joystick's Datalink interface.

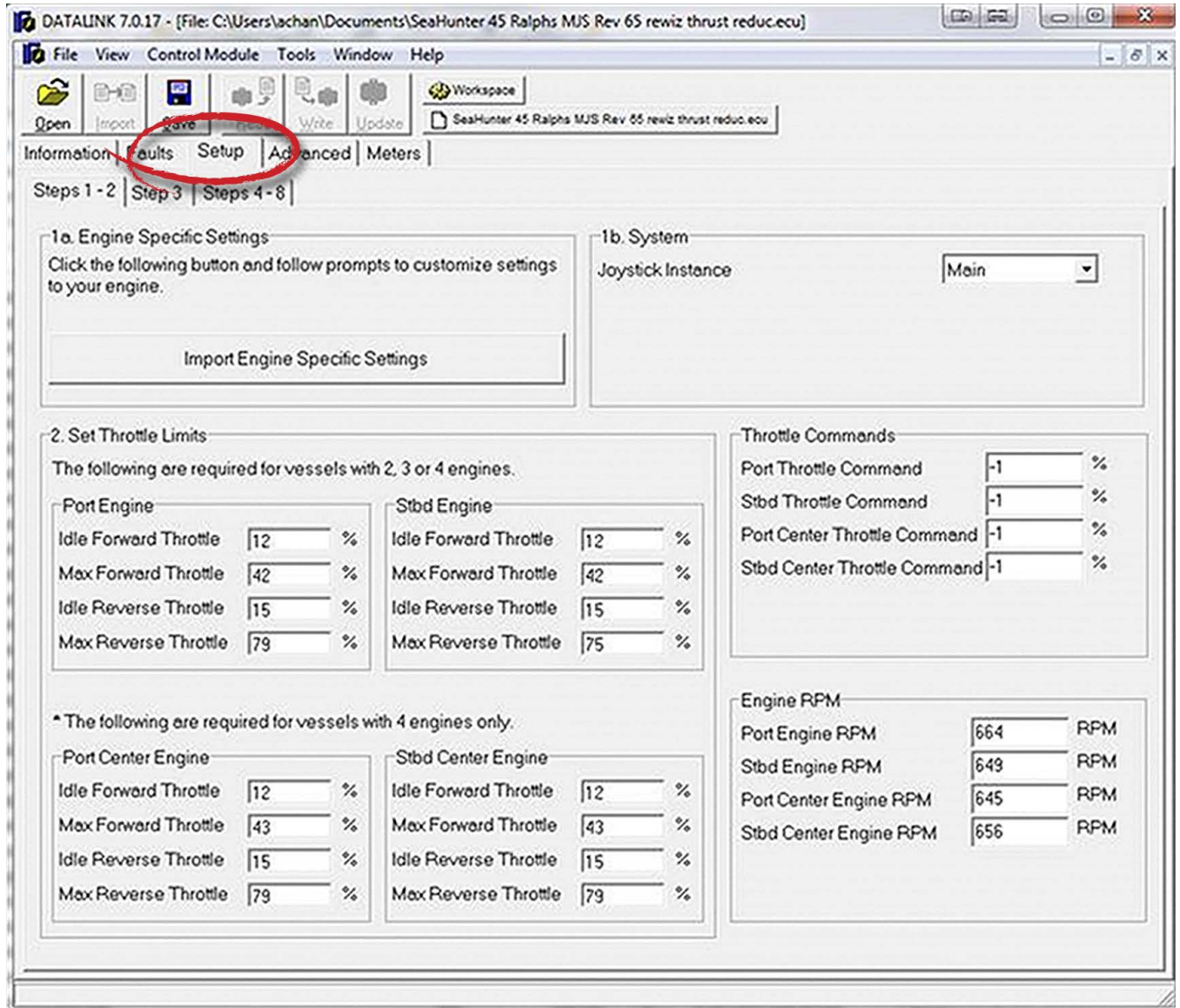


Figure B-4. Joystick Setup tab.



NOTICE!

The joystick tuning procedure will require maneuvering of the boat. Some of these procedures can be performed at dock with the boat securely restrained, but others will require open water with adequate maneuvering space.

B.3.1 General notes

- The joystick tuning procedure consists of several steps, each of which may contain several sub-steps. To differentiate between these we use all capital letters to denote the main STEPS, and lower case letters to indicate the sub-steps.

Example: Adjust the parameter as shown in step 7 of STEP 8.

- When you change a parameter, you must click **Write** to copy it from Datalink to the joystick. Otherwise the change will not take effect.
- Click **Read** at any time to copy the joystick's saved parameters into Datalink. We suggest you do this regularly to confirm that the changes you make have been correctly stored in the joystick.
- To return all parameters to their default settings, click **Reset Setup to Factory Defaults**. Click **Read** to read the default values from the joystick.

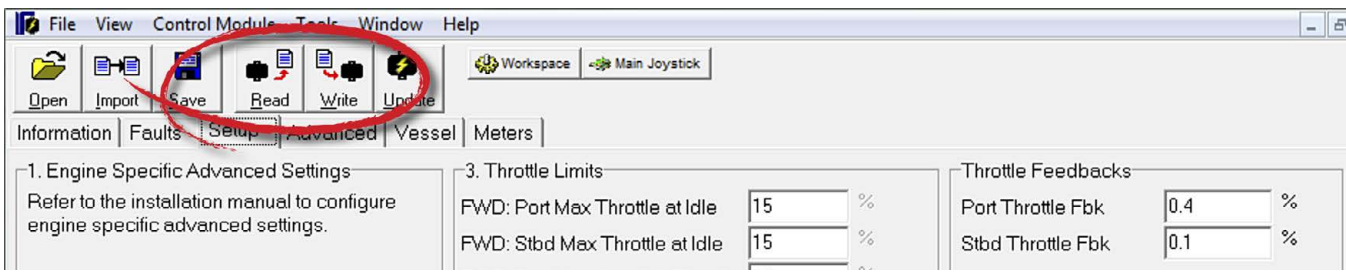


Figure B-5. Read and Write buttons in Datalink.

B.3.2 Before you start

- Trim both engines down and ensure that the correct propellers are installed. You will need to repeat the joystick tuning procedure if you change the propellers afterward.
- Warm up the engines thoroughly before you begin.
- Connect the netbook computer and open Datalink (see section B.1).
- Double-click on the joystick component to access the configuration. If the boat has two control stations, match the serial number on the joystick with the serial number displayed in Datalink to ensure that you are accessing the correct joystick instance. If you aren't sure, you can disconnect the secondary joystick from the CAN2 network and it will be removed from the list of available components. The secondary joystick will be configured in section B.4.



NOTICE!

Erratic engine performance, stalling, or other engine control issues will affect the operation of the joystick control system. Any such issues must be addressed before attempting joystick setup.

B.3.3 STEP 1 – Import engine-specific settings

On the Setup tab of the Joystick interface, click Import Engine Specific Settings. A dialog will pop up, click Yes to confirm.

A file selector will open. From the engine(s) listed, choose the one that matches yours and click Open. Click Yes at the dialog prompts to write and confirm the imported settings.



Figure B-6.

B.3.4 STEP 1a – System

Return to the Setup tab. Set the Joystick Instance to either Main or Second. In most cases you will be doing the setup with the main joystick.



Figure B-7. The System parameters section of the Setup tab.

B.3.5 STEP 2 – Set throttle limits

In this step you will configure:

- the maximum throttle percent at which the engines are at idle and
- the maximum throttle percent intended for joystick use.

Perform this step with the boat safely secured, or in an open area.



NOTICE!

If you are having problems getting an engine to idle, or if it is idling intermittently at different RPMs, confirm that your engine's throttle position sensor (TPS) is functioning properly.

1. Maximum Throttle at Idle (Forward)
 - a. Use the control head to put the port engine in forward gear.
 - b. Very slowly increase throttle until the engine RPM increases. Note the maximum throttle percentage at which the engine is still at idle. (The RPM and throttle percentage are displayed in the boxes as shown in figure B-8).
 - c. Enter the value in the Port Idle Forward Throttle.

2. Set Throttle Limits

The following are required for vessels with 2, 3 or 4 engines.

Port Engine		Stbd Engine	
Idle Forward Throttle	12 %	Idle Forward Throttle	12 %
Max Forward Throttle	42 %	Max Forward Throttle	42 %
Idle Reverse Throttle	15 %	Idle Reverse Throttle	15 %
Max Reverse Throttle	79 %	Max Reverse Throttle	75 %

* The following are required for vessels with 4 engines only.

Port Center Engine		Stbd Center Engine	
Idle Forward Throttle	12 %	Idle Forward Throttle	12 %
Max Forward Throttle	43 %	Max Forward Throttle	43 %
Idle Reverse Throttle	15 %	Idle Reverse Throttle	15 %
Max Reverse Throttle	79 %	Max Reverse Throttle	79 %

Throttle Commands	
Port Throttle Command	-1 %
Stbd Throttle Command	-1 %
Port Center Throttle Command	-1 %
Stbd Center Throttle Command	-1 %

Engine RPM	
Port Engine RPM	664 RPM
Stbd Engine RPM	649 RPM
Port Center Engine RPM	645 RPM
Stbd Center Engine RPM	656 RPM

Figure B-8. Throttle Limits are found on the Setup tab.

2. Maximum Joystick Throttle (Forward)
 - a. Slowly increase throttle until the engine reaches approximately 1800 RPM.
 - b. Enter the throttle percentage in Port Max Forward Throttle.
3. Maximum Throttle at Idle (Reverse)
 - a. Put the port engine in reverse gear.
 - b. Very slowly increase throttle and note the maximum throttle percentage at which the engine is still at idle.
 - c. Enter the value in Port Idle Reverse Throttle.
4. Maximum Joystick Throttle (Reverse)
 - a. Slowly increase throttle until the engine reaches the maximum desired RPM for joystick operation. This will be either:
 - i. the maximum throttle just before cavitation, or
 - ii. if cavitation does not occur, the maximum throttle for comfortable use.
 - b. Enter the throttle *percentage* in the Port Max Reverse Throttle field. Write down the corresponding *RPM* in the adjacent table – you will use it in STEP 3.
 - c. Return the engine to neutral.
5. Repeat the preceding steps for the starboard engine. On a quad-engine vessel you will also need to set the throttle limits for the port center and starboard center engines. Be sure you are entering the throttle percentages in the correct boxes.
6. Click **Write** to save the values.

RPM @ Maximum joystick throttle in reverse	
Port	Starboard
Port Center	Starboard Center

Table B-1.

B.3.6 STEP 3 – Run throttle wizards

The engine response wizards will use the values acquired in STEP 2 to develop a relationship between throttle and RPM that the joystick will use to improve its control of the vessel. Perform with boat safely secured, or in an open area.

Forward Throttle Wizard:

1. Press **Take Command** on the joystick. Ensure boost mode is *off*.
2. Click **Run Port Engine Forward Throttle Wizard** (see figure B-9).
The joystick's A LED will flash to indicate the port wizard is running.

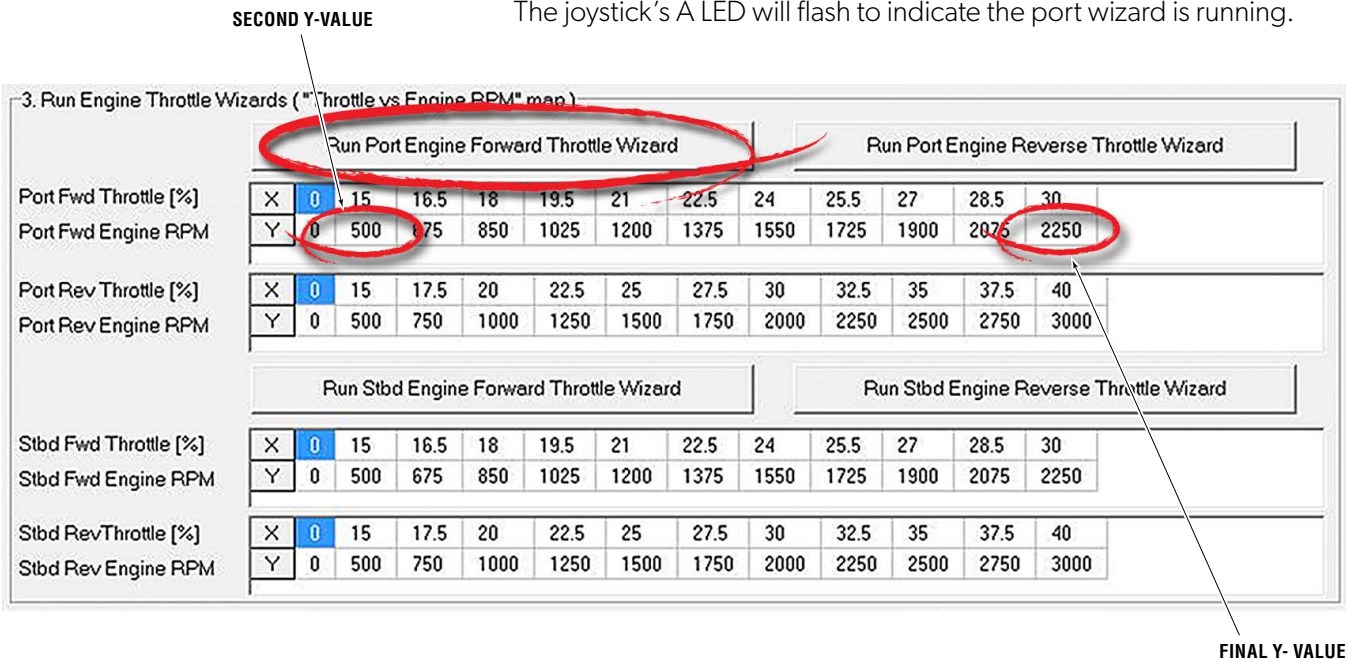


Figure B-9. The engine response configuration wizards are found on the Setup tab.

3. Push and hold the joystick all the way forward. The wizard will increase throttle from maximum idle throttle to maximum joystick throttle (recorded in STEP 2) in increments, returning to zero throttle before each increment.
 - a. If necessary, rotate the joystick to correct the boat's heading.
To abort the wizard release the joystick.
 - b. When the wizard finishes the LED will stop flashing. This takes about one minute.
4. Click **Read** to import the wizard values into Datalink.
5. Examine the second *Y-value* (see figure B-9) in the table. If it is more than 100 RPM higher than the engine's in-gear idle RPM, go back to STEP 2 and *decrease* FWD: Port Max Throttle at Idle by 0.5%. Click **Write** if you make a change.
6. Examine the *final Y-value* in the table. The target value is 1800 ± 200 .
 - a. If it is less than 1600, go back to STEP 2 and *increase* FWD: Port Max Joystick Throttle by 0.5%.
 - b. If it is more than 2000, *decrease* FWD: Port Max Joystick Throttle by 0.5%.
 - c. Click **Write** if you make a change.

7. If you changed the throttle parameters, repeat the wizard and recheck the results until the conditions are met.
8. Click **Run Stbd Engine Forward Throttle Wizard** to repeat this procedure for the starboard engine. The C LED will flash on the joystick to indicate the starboard wizard is running.

Reverse Throttle Wizard:

Run the reverse wizards with the joystick held in full reverse. The procedure is identical, except that the target for the final Y-value (step 6) is the maximum RPM you recorded in STEP 2. Use the same adjustments to ensure the final Y-value is within 200 RPM of the target.

Center Engines:

On quad-engine vessels you will need to run the wizards for the port center and starboard center engines as well.



NOTICE!

It isn't necessary that the port and starboard Throttle vs RPM maps are identical. The system will synchronize the engines to the same speed.

B.3.7 STEP 4 – Set forward heading correction

In this step you will adjust the rudder angles to minimize sideways drift when piloting the boat straight ahead with the joystick. Perform in an area with no wind or current.

1. Press **Take Command** on the joystick. Ensure boost mode is *off*.
2. Push the joystick all the way forward without rotating the knob. If the boat holds a straight course then no adjustment is necessary. Move on to STEP 5.
3. Change the Rudder Correction value until the boat holds a straight course. Remember to click **Write** with each change.
 - a. Each unit equals one degree of rudder correction. If the boat drifts to port, enter a positive value. If the boat drifts to starboard, enter a negative value.

4. Set Forward Heading Correction	
Rudder Correction	<input type="text" value="0.0"/> *

Figure B-10. Rudder correction.

B.3.8 STEP 5 – Balance rotation power

In this step you will tune the power ratio between the FWD and REV engines to yield tight circles in rotation (ROT) mode. Perform in an area with no wind or current to remove outside interference.

1. If this is the initial tune, skip to step 3.
If you adjusted the power levels in STEP 8 and are now performing a re-tune, adjust the X-values in the table as follows (see figure B-11):
 - a. 1st = 0
 - b. 2nd = Normal Rotation Power from STEP 8
 - c. 3rd = Boost Rotation Power from STEP 8, minus 10%
 - d. 4th = 100
2. **Write** settings.

Power Level [%]	X	0	65	75	100
Rotation Rev/Fwd Ratio [%]	Y	150	150	150	150

Figure B-11. Power level vs rotation ratio.

3. Bring the boat to a complete stop with boost mode off.
4. Rotate the joystick clockwise (CW).
 - a. If the boat moves aft while rotating, decrease both *normal mode Y-values* (see figure B-11) by the same amount. If the boat moves forward, increase the values.
 - To start, adjust in increments of up to 50 units. Decrease the increment size as the fore/aft movement is reduced.
 - b. **Write** settings.
 - c. Repeat until the boat rotates on the spot with no fore/aft movement.
5. Press **Boost** on the joystick to enable boost mode, then repeat step 4. This time, adjust the *boost mode Y-values* until fore/aft movement is eliminated while rotating.
6. **Write** settings.

TECH TIP

In many vessels, the Y-values will all be the same.

B.3.9 STEP 6 – Set sideways rudder angle

When moving sideways we don't want the boat to rotate. We achieve this by tuning the Power Level vs Rotation Ratio map. Perform in an area with no wind or current to remove outside interference.

This step only adjusts for rotation during sideways movement. Fore/aft movement during sideways movement will be adjusted in STEP 7.

1. If this is the initial tune, skip to step 3.

If you adjusted the power levels in STEP 8 and are now performing a re-tune, adjust the X-values in the table as follows (see figure B-12):

- 1st = 0
- 2nd = Normal Sideways Power from STEP 8
- 3rd = Boost Sideways Power from STEP 8, minus 10%
- 4th = 100

2. Write settings.

6. Set Sideways Rudder Angle ("Power level vs Rudder Angle" map)					
Power Level [%]	X	0	65	75	100
Sideways Rudder Angle [*]	Y	18.0	18.0	18.0	18.0

Figure B-12. Power level vs rudder angle.

3. Bring the boat to a complete stop with boost mode off.

4. Move the joystick sideways fully to port without rotating the knob.

- If the boat rotates clockwise as it starts to move, decrease both *normal mode Y-values* (see figure B-12) by up to two units. If the boat rotates counterclockwise, increase the values.

• *Note:* The boat will rotate counterclockwise as it gains speed. This is normal – our objective is to remove rotation during *initial* movement.

- Write** settings.

- Repeat until the boat's initial movement is directly sideways.

5. Repeat step 4 with boost mode enabled. This time adjust the *boost mode Y-values* until there is no rotation during initial movement.

6. Write settings.

TECH TIP

In many vessels, the Y-values will all be the same.

B.3.10 STEP 7 – Balance sideways engine power

In this step you will adjust the power ratio between the REV and FWD engines to eliminate fore/aft movement when moving the boat sideways. Perform in an area with no wind or current to remove outside interference.

1. If this is the initial tune, skip to step 3.
If you adjusted the power levels in STEP 8 and are now performing a re-tune, adjust the X-values in the table as follows (see figure B-13):
 - a. 1st = 0
 - b. 2nd = Normal Sideways Power value from STEP 8 plus 5 units
 - c. 3rd = Normal Sideways Power value from STEP 8, minus 10%
 - d. 4th = 100
2. **Write** settings.

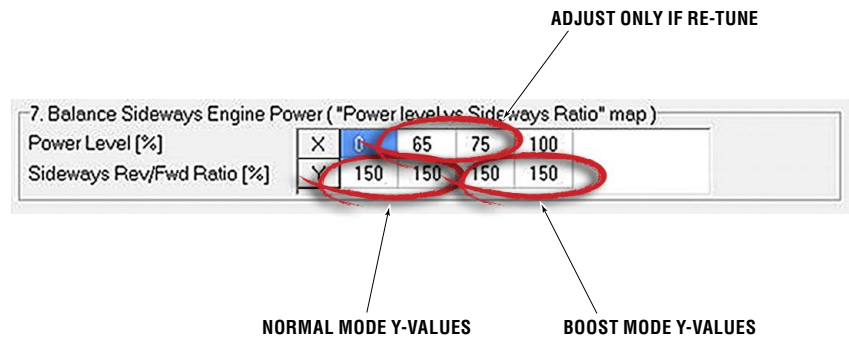


Figure B-13. Sideways REV/FWD ratio curve parameters.

3. Bring the boat to a complete stop with boost mode off.
4. Move the joystick sideways fully to port without rotating the knob.
 - a. If the boat moves aft, decrease both *normal mode Y-values* (see figure B-13) by the same amount. If the boat moves forward, increase the values.
 - To start, adjust in increments of up to 50 units. Decrease the increment size as the fore/aft movement is reduced.
 - b. **Write** settings.
 - c. Repeat until the boat moves directly sideways.
5. Repeat step 4 with boost mode enabled. This time adjust the *boost mode Y-values* until the boat moves directly sideways.
6. **Write** settings.

TECH TIP

In many vessels, the Y-values will all be the same.

B.3.11 STEP 8 – Adjust power levels

In this step you will customize the boat's response by fine-tuning power levels associated with each direction. Note that large changes in these values can affect the rudder offset and FWD/REV ratios calibrated in STEP 4 through STEP 8.



NOTE

When fine-tuning power levels, always return the joystick to center position after making any adjustment. Make *small* changes and click **Write** after every change.

8. Adjust Power Levels		
Normal Forward Power	30	%
Normal Reverse Power	40	%
Normal Sideways Power	65	%
Normal Rotation Power	65	%
Boost Forward Power	40	%
Boost Reverse Power	50	%
Boost Sideways Power	85	%
Boost Rotation Power	85	%

Figure B-14. Vessel control power levels.

1. Ensure boost mode is off.
2. Move the joystick all the way forward and adjust Normal Forward Power until the boat's speed over water (SOW) is 3–4 knots.
3. Move the joystick to full forward and hold until the boat is at speed. Abruptly move the joystick to full reverse and hold until the boat stops its forward motion.
 - a. If the boat does not stop quickly enough, increase Normal Reverse Power and repeat until you are satisfied with the stopping time.
4. Move the joystick all the way port and adjust Normal Sideways Power until the boat moves sideways at a comfortable close-quarters docking speed.
5. Rotate the joystick all the way clockwise and adjust Normal Rotation Power until the boat rotates at a comfortable close-quarters docking speed.
6. Press **Boost** to enable boost mode.
7. Move the joystick all the way forward and adjust Boost Forward Power until the boat's SOW is 4–5 knots.
8. Move the joystick to full forward and hold until the boat is at speed. Abruptly move the joystick to full reverse and hold until the boat stops its forward motion.
 - a. If the boat does not stop quickly enough, increase Boost Reverse Power and repeat until you are satisfied with the stopping time.
9. Move the joystick all the way port and adjust Boost Sideways Power until the boat moves sideways noticeably faster than in normal mode.
10. Rotate the joystick all the way clockwise and adjust Boost Rotation Power until the boat rotates noticeably faster than in Normal mode.
11. *Changes in these values can affect previously calibrated parameters. If you changed any of these parameters by more than 5 units, repeat STEPS 5 through 7.*

B.3.12 STEP 9 – Sea trial

Now that the basic setup procedure is completed, it is time to conduct a basic sea trial to confirm good joystick performance. Perform the sea trial in an open area and pay particular attention to gear engagement, boat response and stopping power.

Gear Engagement

Perform the following actions and check that the gear shifts occur within approximately two seconds. If you find that gear engagement is taking longer contact Dometic technical support.

1. Engage Boost mode.
2. Move the joystick all the way to port for a few seconds.
3. Move the joystick all the way to starboard for a few seconds.
4. Move the joystick back to port.
5. Repeat, pausing at the neutral position for one second when changing directions.

Boat response

Step through all the Joystick Modes of Operation shown on the Optimus 360 Joystick Quick Reference Guide and confirm that:

1. boat response is predictable
2. speeds are safe for operation in a marina
3. boost mode gives noticeably higher thrust than normal mode.

If the boat performance does not meet all of these requirements, return to STEP 8 and adjust the power levels according to the instructions. If further adjustments do not help, or if you need assistance, contact Dometic technical support.

Stopping power

1. In normal mode, hold the joystick all the way forward until the boat reaches its maximum speed.
2. Abruptly move the joystick all the way into reverse.
3. Confirm that the boat's stopping power is adequate.
4. Repeat the test in boost mode.

If the stopping power is insufficient for safe operation, return to STEP 8 and increase the Reverse Power parameters as required.

B.3.13 STEP 10 – Saving the joystick tuning file

The joystick tuning (.ecu) file should be saved as a backup in the event of a joystick failure, or to facilitate setup of a second control station. You will also need to email a copy of the tuning file to Dometic as part of the post-installation warranty checklist (Part # 214740). Refer to section 9.2.10 in the Optimus EPS Installation Manual (Book 65) for instructions.

B.4 Adding a second control station

At a minimum, a second control station must consist of a helm, a control head, and an alarm buzzer. A secondary joystick and CANtrak display are optional.

B.4.1 Configure the secondary helm and CANtrak display

If the secondary helm and CANtrak display have not already been configured, refer to the Optimus EPS Installation Manual (Book 65) for instructions.

B.4.2 Configure the secondary control head (Yanmar Only)

The instance setting of the secondary control head needs to be configured, and any changes to the user parameters on the primary control head need to be copied.

Procedure

1. If both control heads are connected to the CAN2 network you will see two Main Control Head instances in the Interfaces list. Click the + beside both instances to view the serial numbers associated with them, then identify which of the two instances is installed as the secondary control head. Connect to it by double-clicking it.
2. Open the Parameters tab and change the Control Head instance to Second.

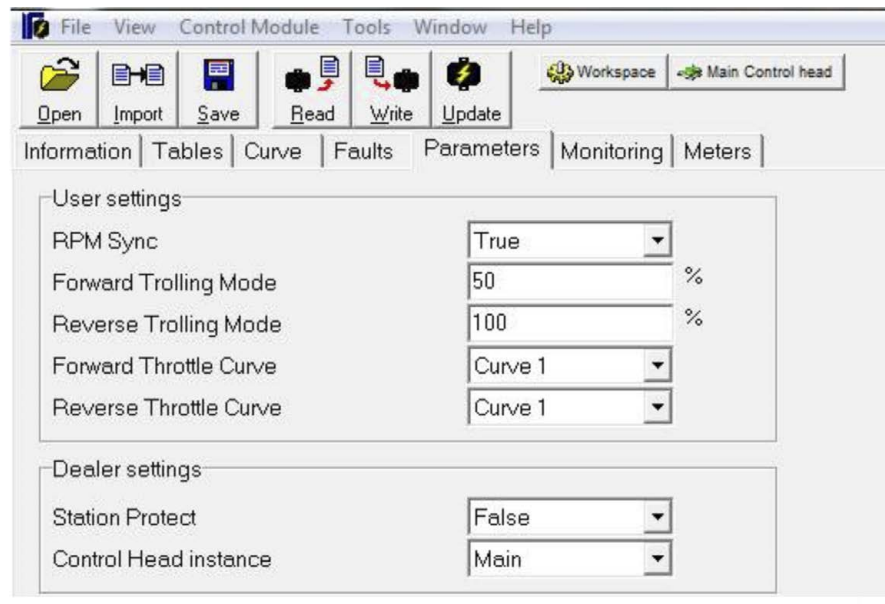


Figure B-15. Configuring the second station control head.

3. Update the settings, if required, to match the primary control head.
4. Click Write to save the change.

B.4.3 Configure the secondary joystick

It is important that both joysticks are configured with the same tuned parameters to ensure that the boat handles correctly when controlled from either station. The simplest way to do this is to import the tuning (.ecu) file from the primary (main) joystick to the secondary joystick. See section B.5.1 for details.

B.5 Importing a joystick tuning file

The Import utility in Datalink allows you to copy an existing joystick tuning file into another joystick. This makes it easy to:

- configure a second station joystick.
- use a template tuning file to set up identical vessels without tuning every vessel individually.
- replace a joystick.
- update the firmware revision on a joystick.

B.5.1 Configuring a second joystick

You will be importing the .ecu tuning file that you saved in STEP 10 of the joystick tuning procedure. Follow the basic import procedure shown in section B.5.5. Be sure to set the joystick instance number to 2 in step 4.

Once you have completed the import procedure, perform a sea trial as shown in STEP 9 (section B.3.12) using both joysticks. Confirm that the vessel performs as expected from both stations.

B.5.2 Using a template file

If you are setting up identical vessels, you can use the tuning file from the first vessel as a template for others. For vessels to be considered identical they must have the same hull (model and size) and the same engines (model, horsepower, and propellers). If any of these conditions are not met you will need to perform a full joystick tune.

When you plan to use a joystick tuning file as a template for identical vessels, save it with a meaningful name in a dedicated folder.

Example: Joystick Template – Hull Model – Engine Model – Date.ecu

You will need:

- a copy of the template tuning file (.ecu) on your computer.
- the latest firmware revision on all system components. See section 11.0 of Book 65 for firmware updating instructions.

Procedure

1. Follow the basic import procedure in section B.5.5. Be sure to select the correct template file and the correct joystick instance number for the destination joystick.
2. Open the joystick's interface in Datalink.
3. Perform STEP 2 (section B.3.5) and STEP 3 (section B.3.6) of the joystick tuning procedure. (This is necessary because throttle response can vary from engine to engine.)
4. Perform a sea trial as shown in STEP 9 (section B.3.12). If the vessel's performance under joystick control is poor, double-check that the template file you used was for an identical vessel.

B.5.3 Replacing a joystick

You will need:

- a copy of the original joystick's tuning file (.ecu) on your computer. If you do not have the tuning file you will need to tune the joystick from scratch (section B.3).
- the latest firmware revision on all system components. See section 11.0 of Book 65 for firmware updating instructions.

Follow the basic import procedure shown in section B.5.5. Once the import is complete, perform a sea trial as shown in STEP 9 (section B.3.12).

B.5.4 Updating joystick firmware

In general, system firmware should always be updated using the 'Update All' utility described in section 11.0 of the Optimus EPS Installation Manual (Book 65).

If you have a situation in which you feel you need to update the joystick firmware on its own, please contact Dometic technical support.

B.5.5 Basic import procedure

1. Connect the destination joystick to the network and open its configuration page with Datalink. If there is more than one joystick on the network, identify the correct joystick by matching the serial number shown in the Workspace with the label on the joystick. Alternatively, you can unplug any other joysticks from the network.
2. Click **Import** in the toolbar. Use the file browser to find the .ecu tuning file you wish to import. Highlight it and click **Open**.
3. You will see the following warning. Click **OK** to continue.

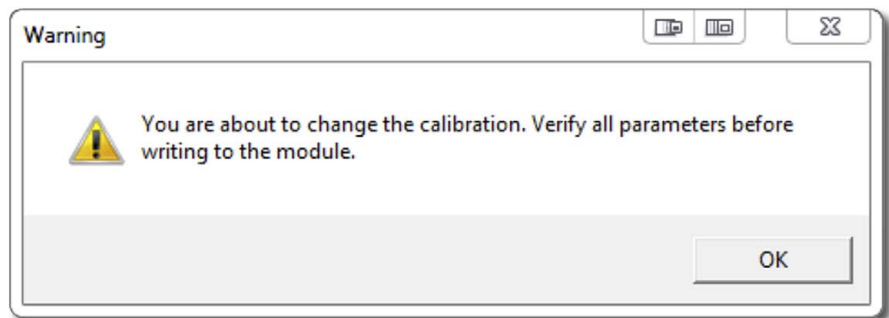


Figure B-16. Import warning dialog.

4. The dialog box shown in figure B-16 will be displayed. Use this dialog to set the instance number of the joystick. If you are configuring a second station joystick, change this instance number to 2. Otherwise, accept the default. Click **OK**.

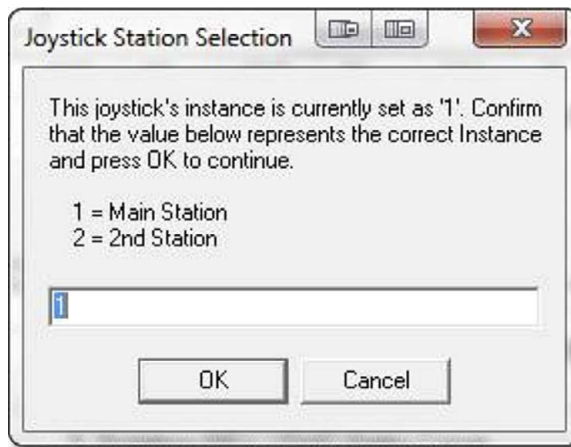


Figure B-17. Joystick instance setting for import.

5. The following confirmation dialog will be displayed. Click **OK** to accept.

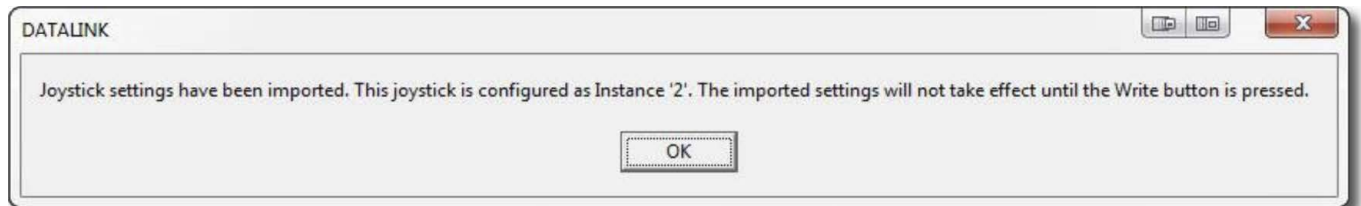


Figure B-18. Joystick import confirmation dialog.

6. Click **Write** to save the settings. At the subsequent prompt, click **Yes**.
7. The Optimus system requires a power cycle before use. Turn the ignition off, wait at least five seconds, then turn it on again.

B.6 Yamaha EST gateway setup

Before configuring the EST gateway you should have already configured the PCM (section B.2) and cycled power to the system. If you haven't done so, do this now. Note: when cycling the power it is important that you switch it off for at least ten seconds.

Connect to the CAN2 network with Datalink. If you don't see the Main EST Gateway in the Interfaces list, double-click on Optimus CAN2 under Protocols. Then double-click on Main EST Gateway to open the interface.

If this is a dual station boat you will see two instances of Main EST Gateway. Expand the items (click on the plus sign to the left) and compare the listed serial number with the gateway you are configuring. It is suggested that you open the interface of the gateway that does not match, go to the Setup tab, and change the Gateway Instance (see figure B-19) to Second. Click **Write** and close the interface. Now you will see a Main EST Gateway and a Second EST Gateway in the Interfaces list. This will reduce any possible confusion during the gateway setup.

Once you are connected to the Main EST Gateway, proceed to Step 1 (section B.6.1).

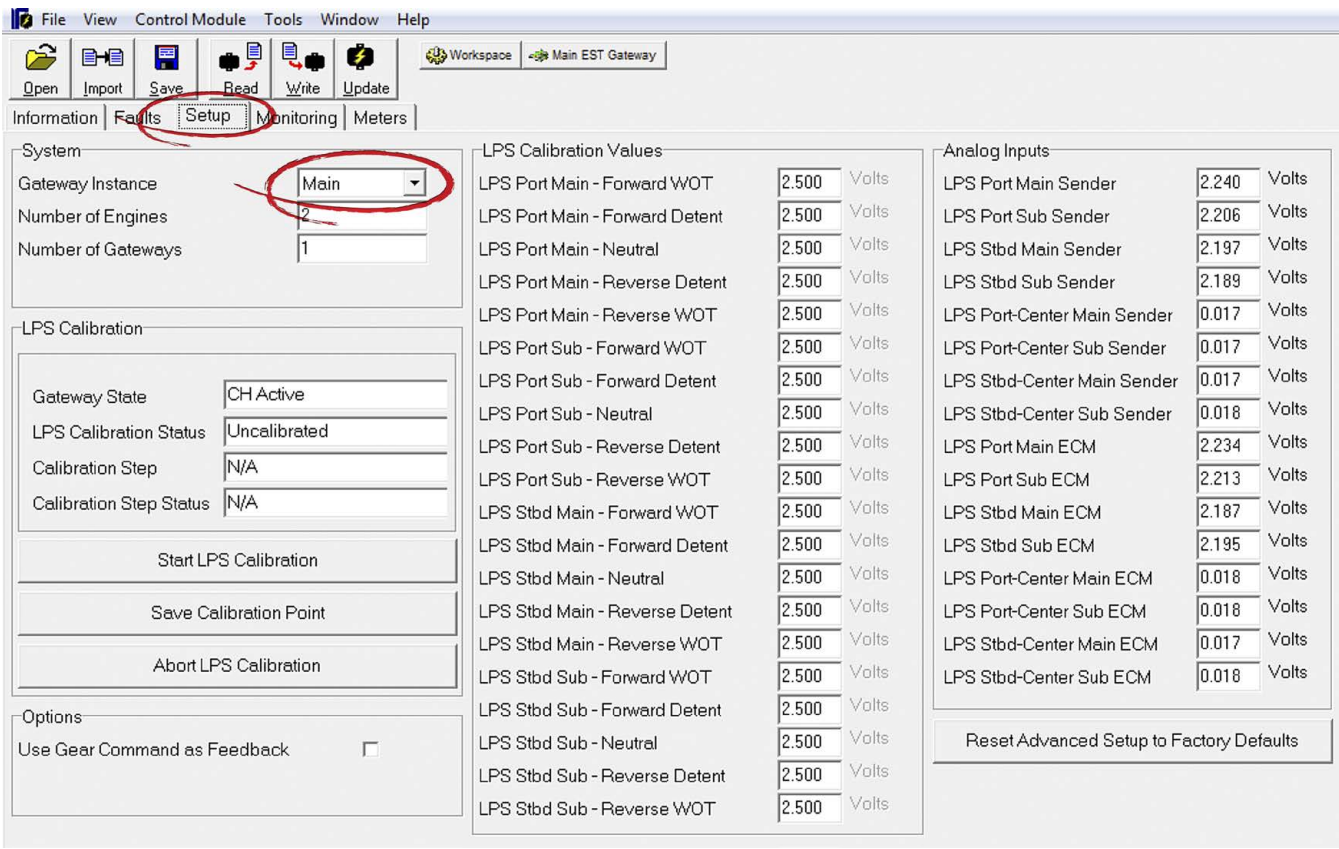


Figure B-19. EST gateway Setup tab, showing default values.

B.6.1 System

Check that the Number of Engines and Number of Gateways parameters match the values entered into the PCM. If they don't, open the PCM interface, make the changes to the PCM configuration, and cycle power again. Do not try to change the values in the gateway interface because they will be overwritten on every power cycle.

System	
Gateway Instance	Main
Number of Engines	2
Number of Gateways	1

LPS Calibration	
Gateway State	CH Active
LPS Calibration Status	Uncalibrated
Calibration Step	N/A
Calibration Step Status	N/A

Start LPS Calibration

Save Calibration Point

Abort LPS Calibration

Options	
Use Gear Command as Feedback	<input type="checkbox"/>

Figure B-20. Gateway defaults.

B.6.2 LPS calibration

In this step you will run a calibration wizard that records the output values from the lever position sensors (LPS) on the control head. In the course of the calibration you will move both control levers to the following prompted positions:

- Forward WOT (wide open throttle)
- Forward detent (engine at idle, forward gear engaged)
- Neutral
- Reverse detent (engine at idle, reverse gear engaged)
- Reverse WOT

You can abort the calibration wizard at any time by clicking **Abort LPS Calibration**. All values will return to their defaults. The calibration will automatically abort if an engine is started during calibration.

1. Click **Start LPS Calibration** with the engines keyed on but *not* running. Click **Yes** to acknowledge the Warning dialog. See figure B-21.

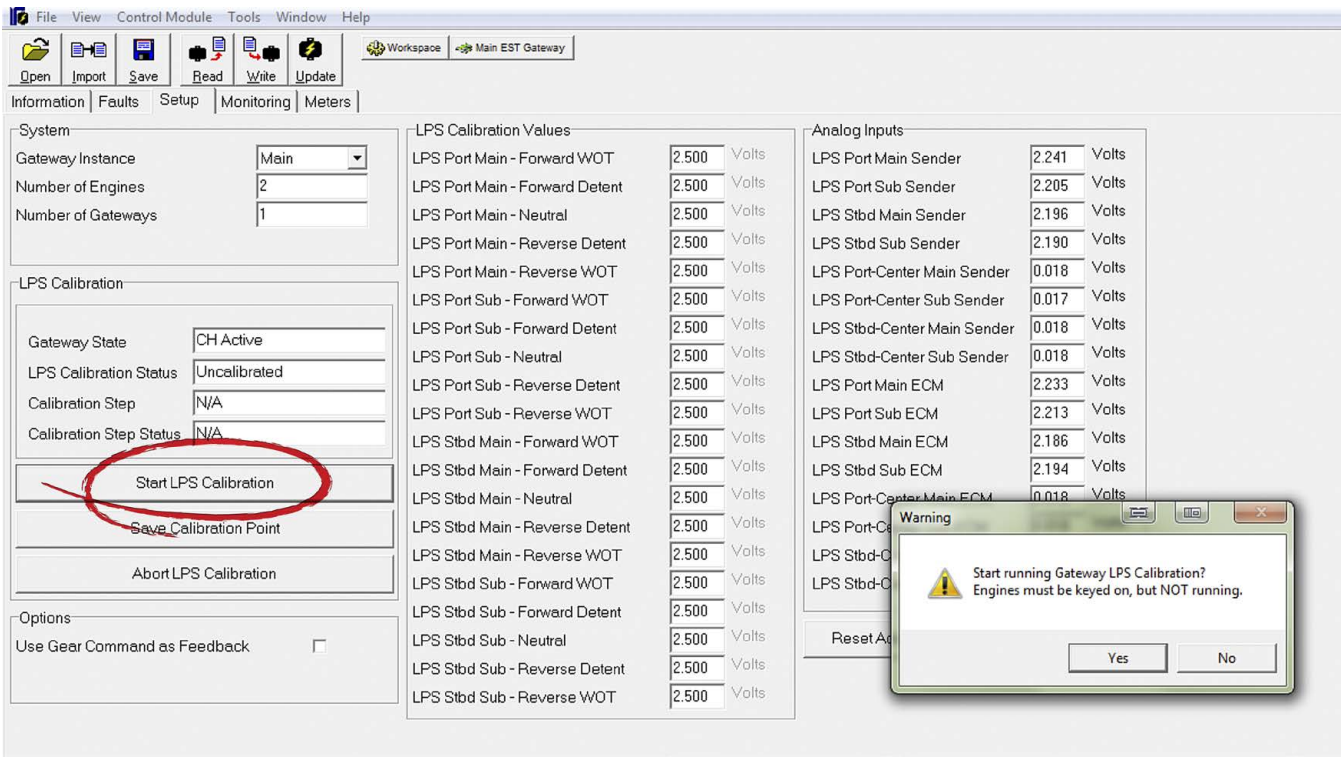


Figure B-21. Start LPS calibration.

2. The LPS Calibration Status field will change to read 'Cal in Progress,' and the Calibration Step field will read 'Forward WOT' as shown in figure B-22.

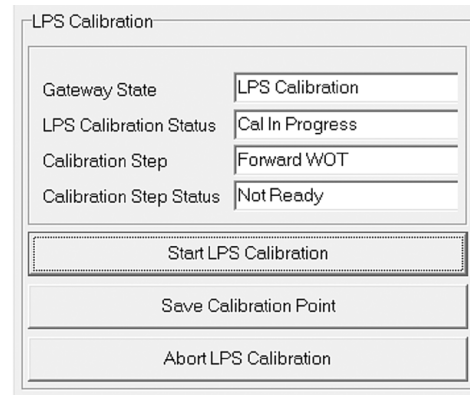


Figure B-22. LPS calibration forward WOT.

3. Move both control levers to the forward WOT position. The Calibration Step Status will change from 'Not Ready' to 'Ready.' (See figure B-23.) Click **Save Calibration Point**.

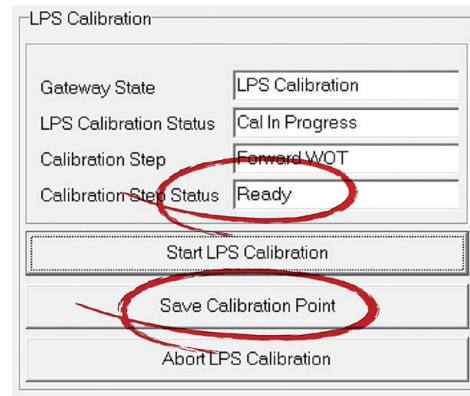


Figure B-23. Forward WOT Ready lever in position.

4. The Calibration Step field will change to 'Forward Detent.' Move the levers to the correct position, and when the Calibration Step Status reads 'Ready,' click **Save Calibration Point**.
5. Continue in this manner through each lever position shown in the Calibration Step field.
6. Once you've calibrated the last lever position, click **Read** and the LPS Calibration Values table will populate with the calibrated values (see figure B-24). The LPS Calibration Status field will now read 'Calibrated' to indicate that calibration is complete.

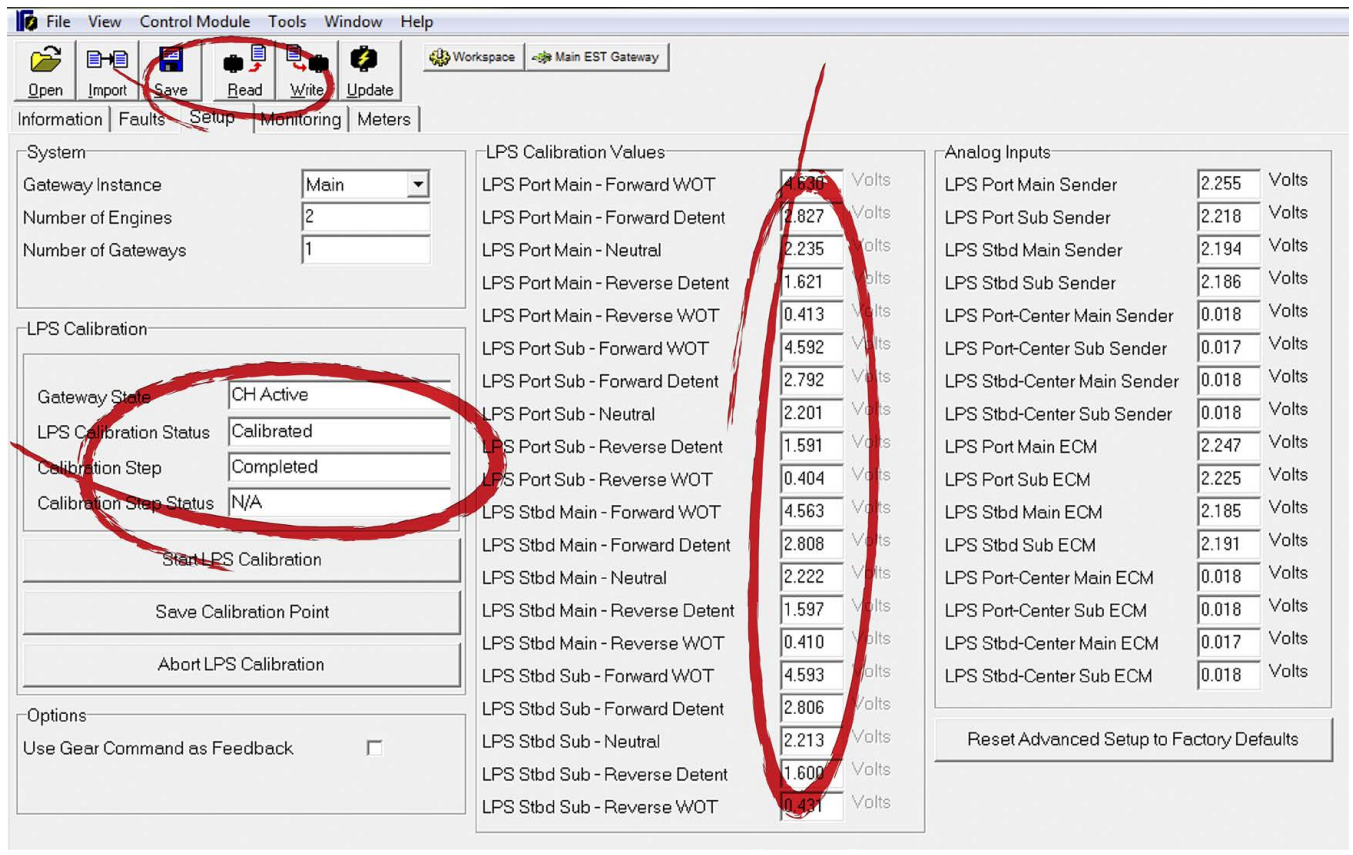


Figure B-24. Sample of final calibration values.

TECH TIP

You are now ready to sea trial the steering system. Refer to **Book 50.1** or **Book 54**. **When the sea trial is complete**, proceed to the joystick setup in section 9 of this manual.

Notes

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