



Livorsi DTS Controls Three/Four Engine Digital Throttle & Shift Installation

NOTICE

This document is written to aid our dealers, boat builders, and company service personnel in the proper installation or service of our products. Persons who are not familiar with these or similar products produced by Livorsi Marine, Inc., and who have not been trained in the recommended servicing or installation procedures should have the work performed by an authorized Mercury Marine dealer technician. Improper installation or servicing of the Mercury Marine or Livorsi Marine product could result in damage to the product or personal injury to the installer or persons operating the product.

NOTICE

After completing installation, these instructions should be kept with the product for the owner's future use.

Notice to Personnel Installing this Kit

The installation of this product requires an installer who is specifically trained to work on Mercury Marine's or Livorsi Marine's digital throttle and shift (DTS) systems. The installer must be trained in the proper installation, electronic calibration, and operation of the DTS system. Failure to correctly install this product may make this product and /or the DTS system inoperable or unsafe for use.

CAUTION

Avoid possible injury or equipment damage. After installing this control, electronically calibrate the digital throttle and shift (DTS) system. Do not attempt any calibration unless you have been specifically trained in Mercury Marine's DTS systems. Improper electronic calibration of the DTS system will make this control and/or the DTS system inoperable or unsafe.

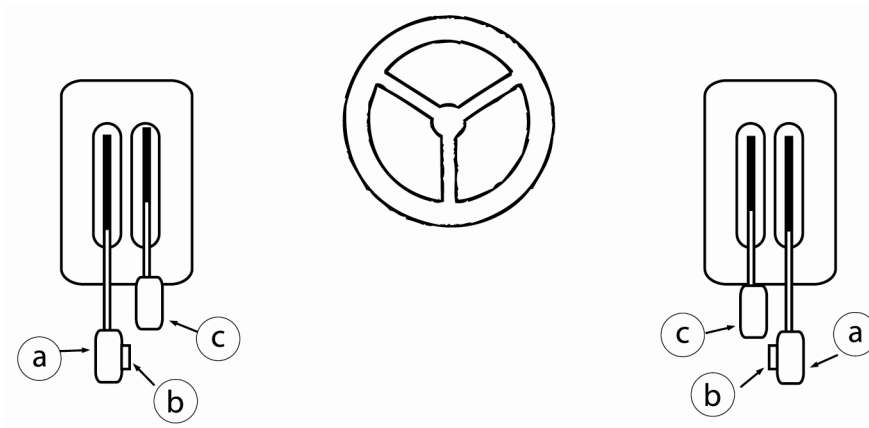
Electrical Requirements

DTS equipped boats require that the electrical systems meet the following guidelines:

- Use only marine starting batteries with a 1000 mca /800 cca/ 180 amp hour rating or higher. Deep cycle batteries do not deliver the power required for the DTS system.
- Secure all battery cables with standard hex nuts, tightened to 13.5 Nm (120 lb. in.) Do not use wing nuts, as they will not secure the battery cables properly.
- Ensure that the battery cable size (cross section) meets the minimum size requirements for the length of cable used. Refer to the installation manual supplied with the engine.
- Ensure that all power supply connections are clean and tight.

Dimensions and Clearances

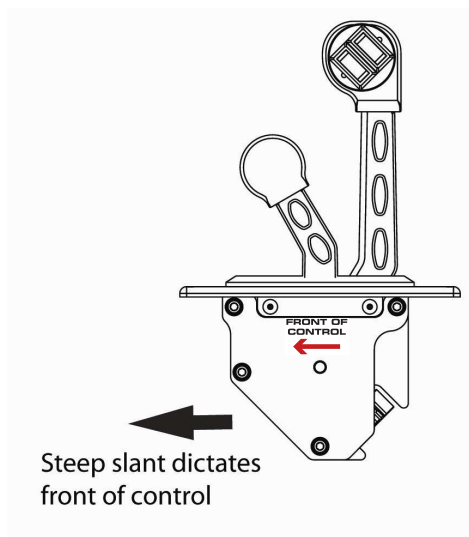
Location Requirements



- a- throttle lever
- b- trim switch
- c- shift lever

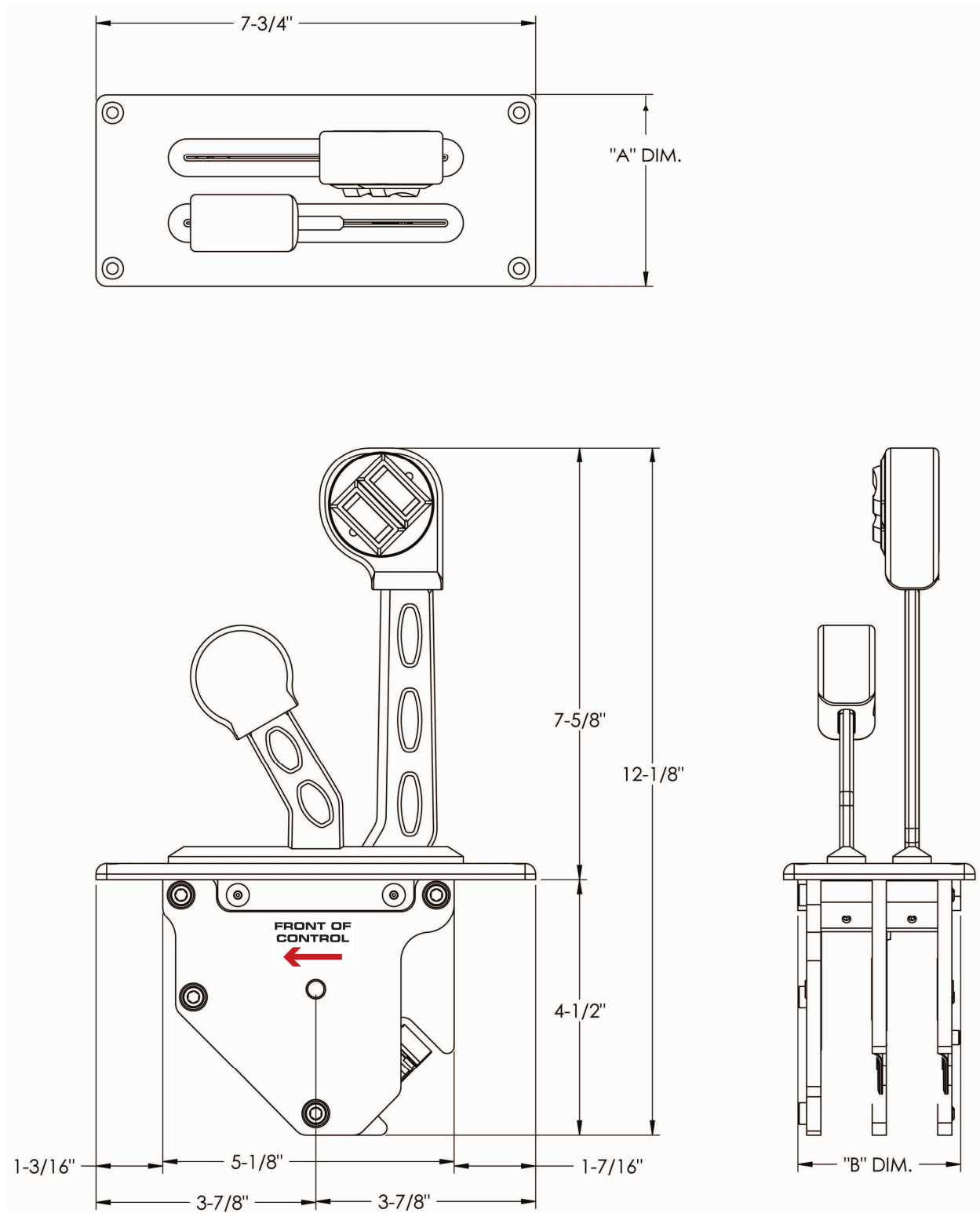
Understand the following criteria when selecting a Livorsi DTS Control location:

- Mount the control to provide the boat operator with a comfortable and controlling position during operation and allow sufficient hand and shift/throttle lever clearance.
- Mount the control to provide enough space for harnesses and wiring beneath the console panel.
- If equipped with a trim switch, locate the switch on the side of the throttle lever closest to the steering wheel.



Livorsi DTS Control Dimensions

See cutout templates at the end of the manual.



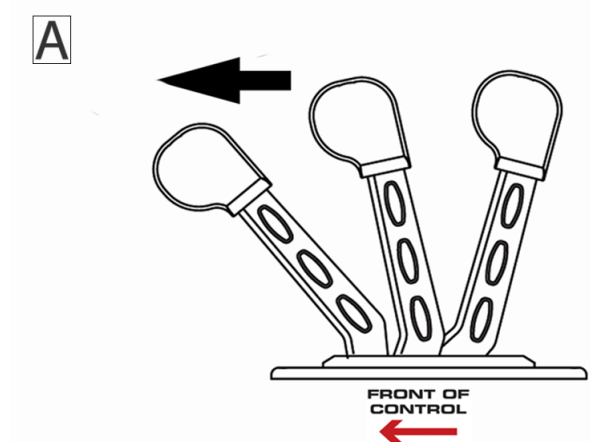
Livorsi DTS Control Dimension Chart

Number of Handles	"A" DIM	"B" DIM
3 handle	4- 1/2 in.	4- 1/64 in.
4 handle	5- 11/16 in.	5- 3/16 in.
6 handle	8 in.	7- 1/2 in.
8 handle	10- 5/16 in.	9- 13/16 in.

Installing the Control

Control Configuration

Important: Canting refers to the direction of bend in handle. Install the Livorsi DTS Controls in the orientation specified (Forward-cant only).



A) Forward cant models; arrow pointing to the ship's bow

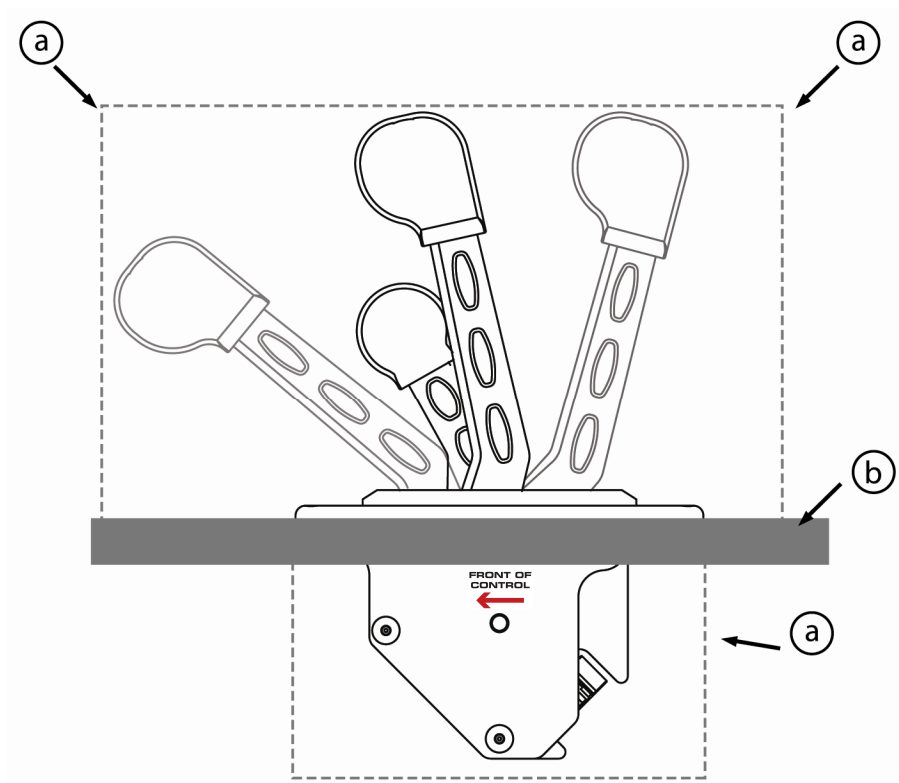
Cutting the Control Console Opening

1. Remove the Console Cutout page, located at the end of this document.
Important: Hole patterns between the DTS flat base and DTS contour base differ.
2. Transfer all drill holes and cut lines to the console in a suitable location. Refer to **Dimensions and Clearances** for help determining the installation location.

Important: Ensure that the area below the console is clear of any wiring or items that may hinder or be damaged by drilling/cutting.

Check for Clearance

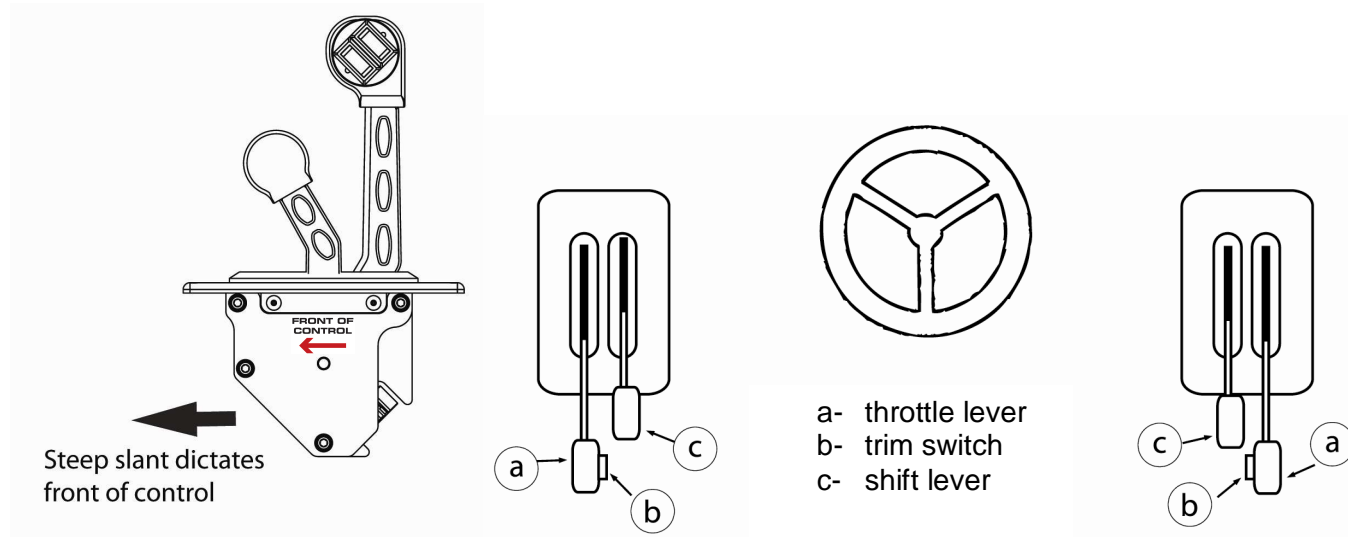
3. Use a #22 drill bit to drill the required holes. Drill perpendicular to the console surface.
4. Saw between the drilled holes along the cut lines. Cut perpendicular to the console surface.
5. Set the control into the opening and check for clearance and fit. Remove the control from the console.



a- clearance areas required (approximate)

b- console

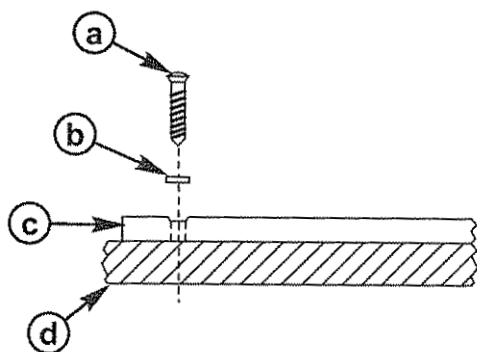
Installing the Control to the Console



CAUTION

Avoid possible corrosion damage. Always install the nylon washer between each screw and the control plate. Improper installation may result in chipped paint, triggering corrosion.

1. Secure the control to the console using the 4x #10 screws and nylon washers.



For an 8 handle control

- 6 x #10 screws
- Nylon washer (6)

Neutral Safety Switch

The Livorsi DTS Control does not have a neutral safety switch. The start-in-gear protection is controlled electronically by the propulsion control module (PCM).

CAUTION

Avoid injury or product damage. Obstructions, such as braces and wiring, may be unseen when looking at the front of the dashboard. Before drilling or cutting any holes in the dashboard, check the area behind the dashboard for obstructions. Do not drill or cut when obstructions are present.

Rigging the Control

NOTE: The following information was current at the time of creation, however it may not be current at the time of installation. Please contact Mercury Marine at 920-929-5000, for the latest installation and wiring diagrams.

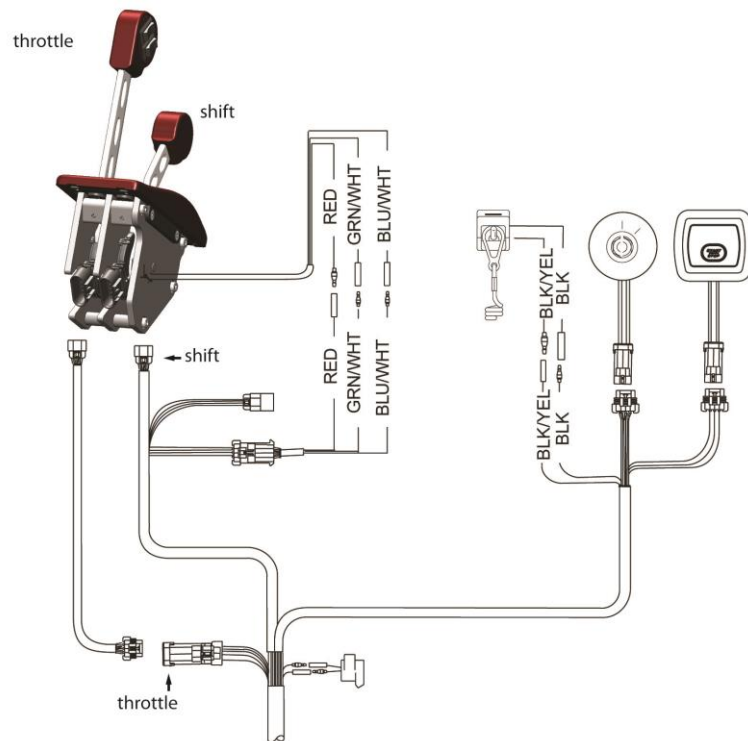
NOTE: For an explanation of Shadow Mode and its applications, please contact Livorsi Marine, 847.752.2700. For detailed instructions on how to install Shadow Mode for a three or four engine application, please contact Mercury Marine, 920-929-5000.

Rigging the Control

Connecting the SmartCraft Harness (Single Engine)

The following procedure explains how to connect the DTS Command Module Harness.

NOTE: The following information has been gathered from Mercury Marine and may not be current. Please contact Mercury Marine at 920-929-5000, for up to date installation and wiring diagrams.



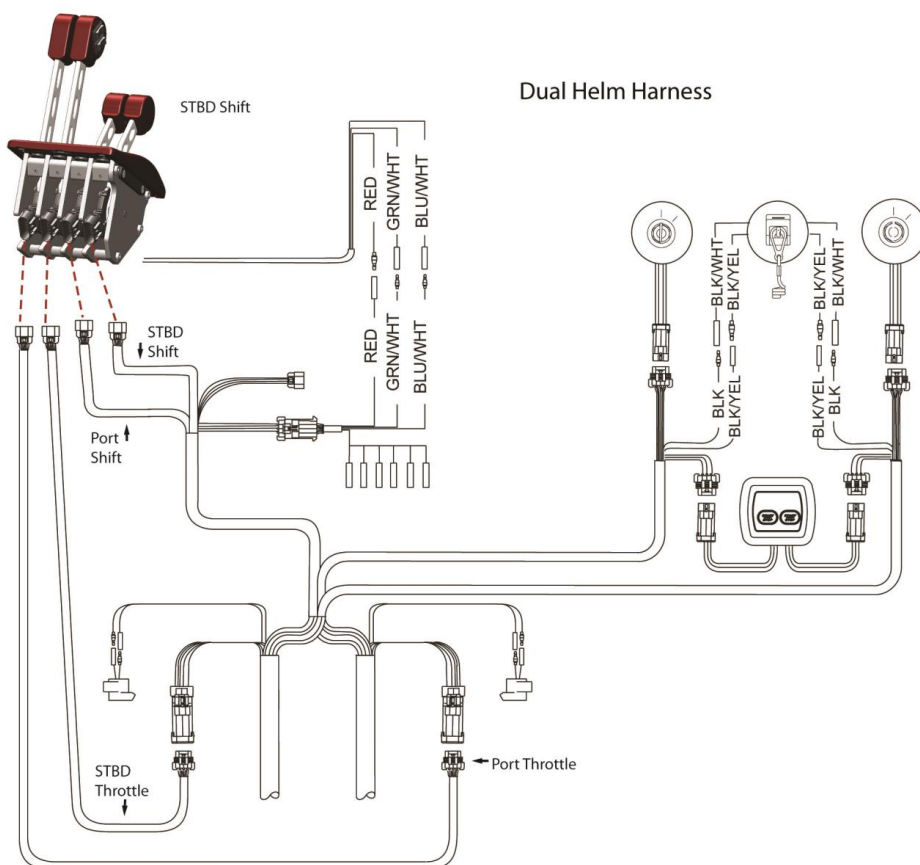
Please note that the arrows point to the hole locations where it is recommended to loop and zip tie the associated harness. Refer to step 7 on the next page.

1. Connect the "LEVER 1" connector on the DTS command module harness to the shift potentiometer on the control console.
2. Connect the "FOOT THROTTLE" connector on the DTS command module harness to the throttle potentiometer on the control console using the adapter harness (P/N 89-891963A01).
3. Connect the trim adaptor harness to the DTS command module harness.
4. Connect the bullet connectors on the trim adaptor harness to the trim connections on the control.
5. Connect the start/stop switch (optional), warning horn, lanyard stop switch and key switch to the appropriate connections.
6. Make all the other DTS command module harness connections following the instructions included with the DTS Command Module kit.
7. Zip tie throttle and shift harnessing to the control base to provide appropriate strain relief.

Connecting the SmartCraft Harness (Dual Engine)

The following procedure explains how to connect the DTS Command Module Harness.

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Please note that the arrows point to the hole locations where it is recommended to loop and zip tie the associated harness. Refer to step 10 on the next page.

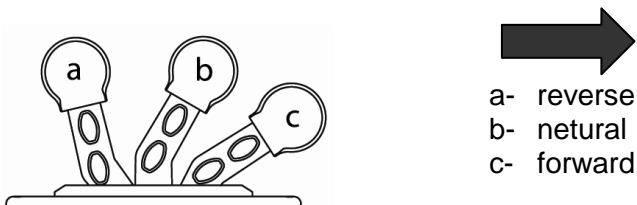
Control Connection	Harness Connection
Starboard Shift Potentiometer	"LEVER 1"
Port Shift Potentiometer	"LEVER 2"
Starboard Throttle Potentiometer	"LEVER 3"
Port Throttle Potentiometer	"LEVER 4"

1. Connect the "LEVER 1" connector on the DTS command module harness to the starboard control's shift potentiometer
2. Connect the "LEVER 2" connector on the DTS command module harness to the port control's shift potentiometer
3. Connect the "LEVER 3" connector on the DTS command module harness to the starboard control's throttle potentiometer using the adaptor harness (P/N 89-891963A01).
4. Connect the "LEVER 4" connector on the DTS command module harness to the port control's throttle potentiometer using the adaptor harness (P/N 89-891963A01).
5. Connect the trim adaptor harness to the DTS command module harness.
6. Connect the bullet connectors on the trim adaptor harness to the trim connections on the control.
7. Connect the six bullet connectors on the trim adaptor harness to the individual trim switches on the dash or console. (optional)
8. Connect the start/stop switch (optional), lanyard stop switch, and key switches to the appropriate connections, as shown.
9. Make all other DTS command module harness connections following the instructions included with the DTS Command Module kit.
10. Zip tie throttle and shift harnessing to the control base to provide appropriate strain relief.

Control Quadrant Operation

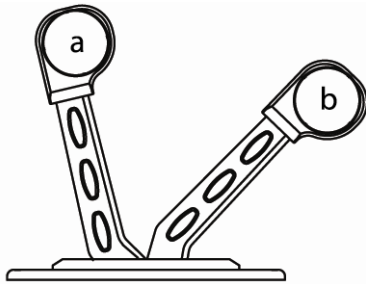
Shift Lever

- Shift into reverse by moving the shift lever to its aft position.
- Shift into neutral by moving the shift lever into its center position.
- Shift into forward by moving the shift lever into its forward position.



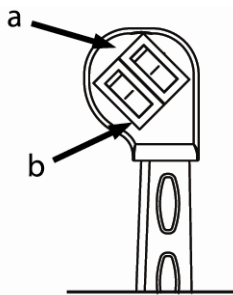
Throttle Lever

- Increase the RPM by moving the throttle lever forward. Achieve wide open throttle (WOT) by placing the throttle lever in its full forward position.
- Decrease RPM by moving the throttle lever back. Achieve minimum RPM (idle) by placing the throttle lever in its full aft position.



- a- minimum RPM (idle)
b- maximum RPM (WOT)

In-Handle Trim Switch

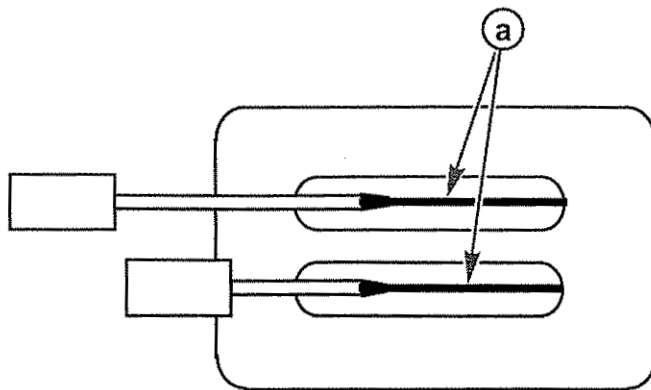


- a- trim up/out
b- trim down/in

1. To trim the outboard or drive up/out, press the top area of the trim button.
2. To trim the outboard or drive down/in, press the bottom area of the trim button.

Control Quadrant Maintenance

IMPORTANT: Periodically lubricate the inside slit area of the rubber boots with a good-quality, rubber-compatible marine lubricant. Use a small amount of lubricant to prevent adverse movement of the rubber boot within the control housing.



- a- rubber boot slit

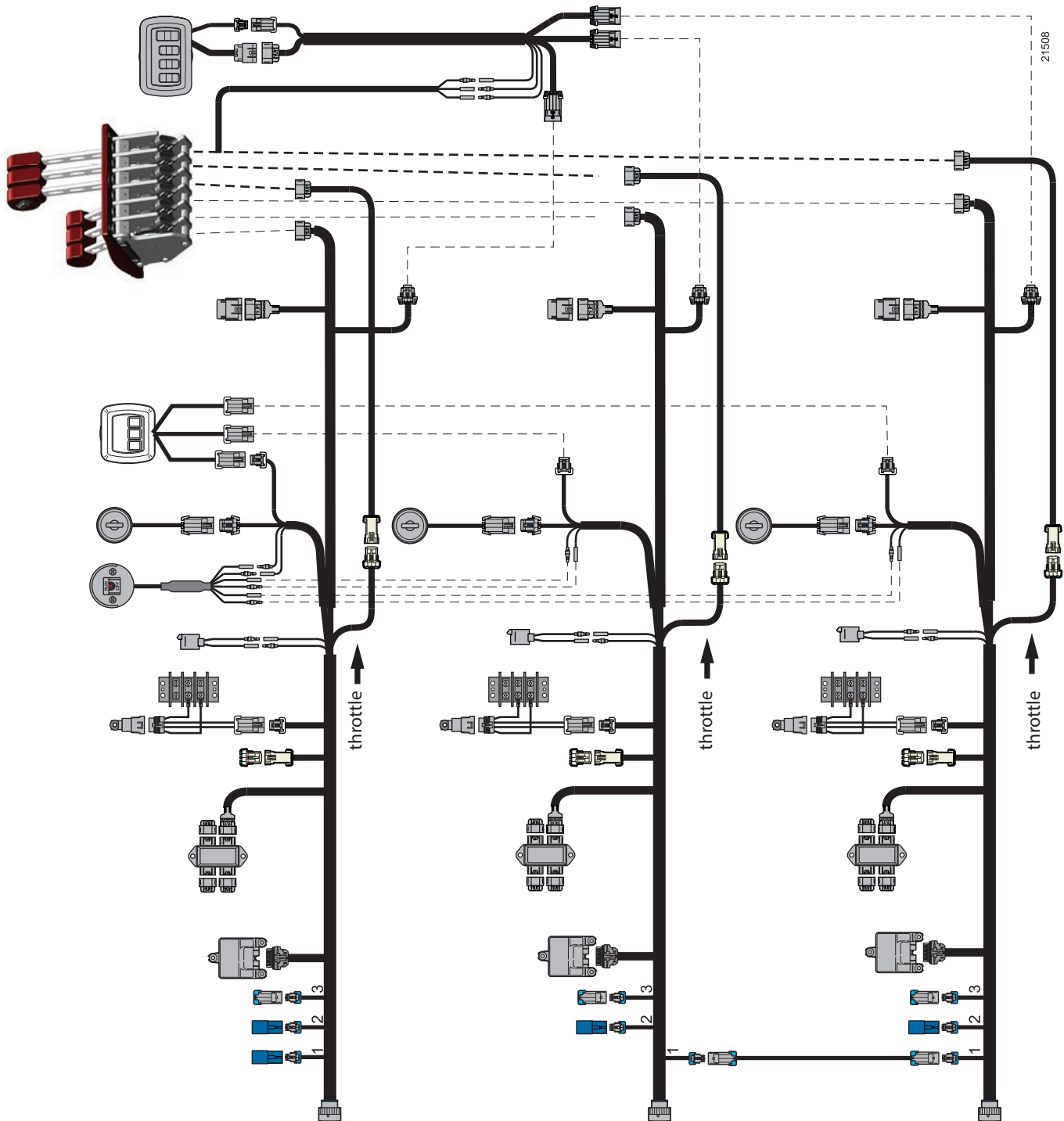
Livorsi DTS Control

Architecture Drawing -Triple Engine

The following information has been gathered from Mercury Marine and may not be current. Please contact Mercury Marine at 920-929-5000, for up to date installation and wiring diagrams.

For Shadow Mode applications, please contact Livorsi Marine, 847.752.2700 for information.

For detailed instructions on how to install Shadow Mode for a three or four engine application, please contact Mercury Marine, 920-929-5000.

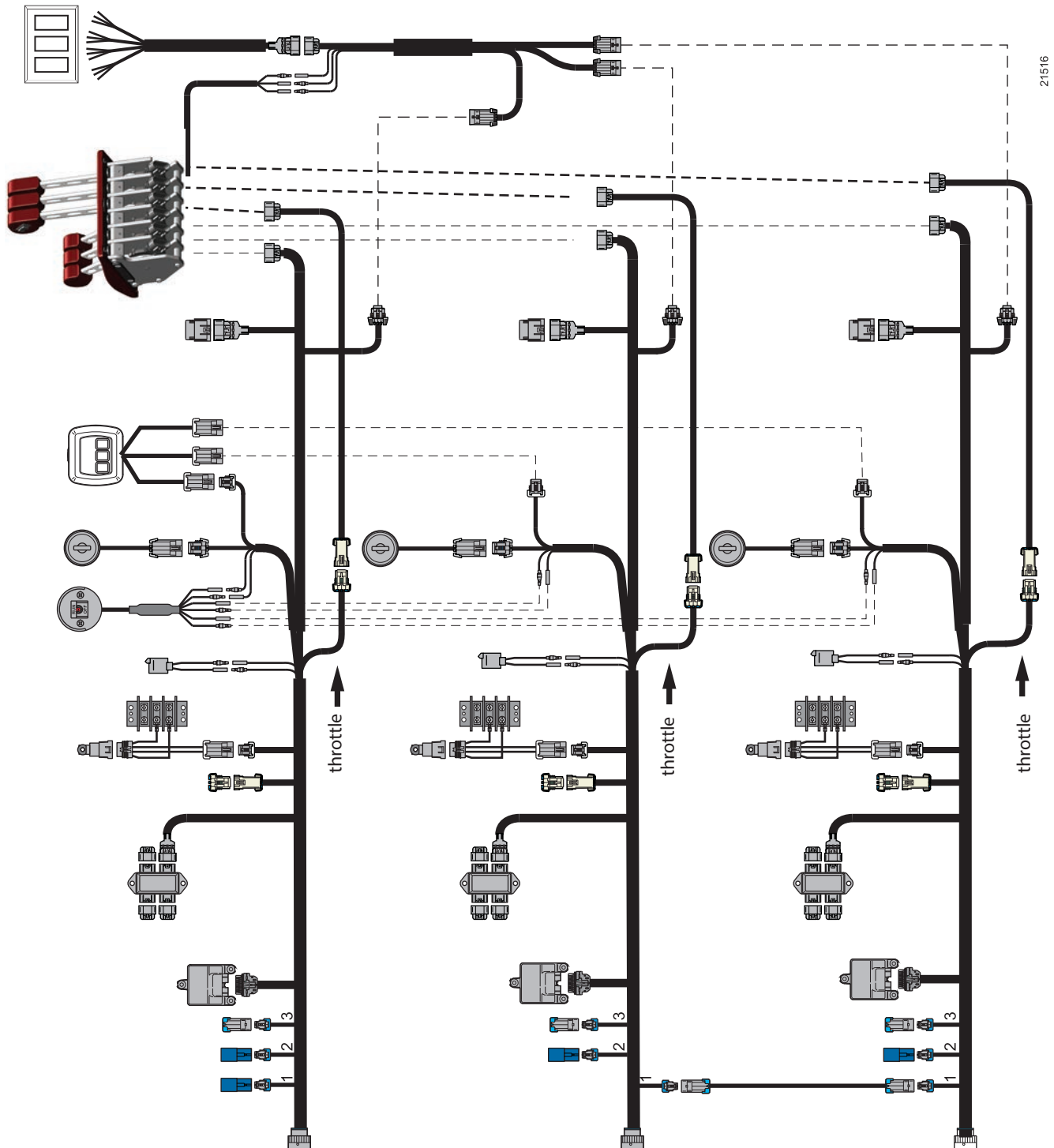


Livorsi DTS Control

Architecture Drawing- Triple Engine- OEM supplied Trim Switches

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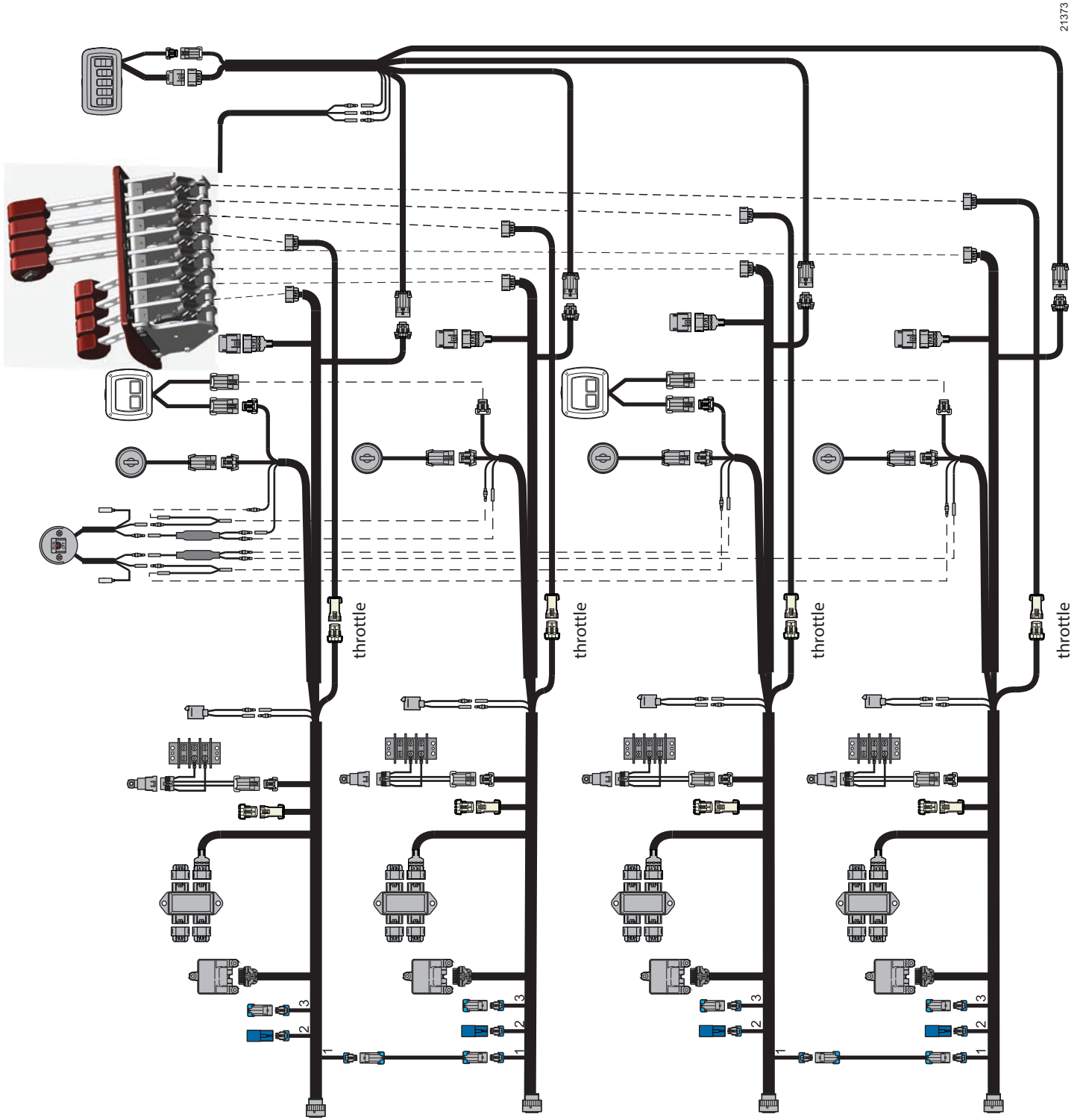
For Shadow Mode applications, please contact Livorsi Marine, 847.752.2700 for information . For detailed instructions on how to install Shadow Mode for a three or four engine application, please contact Mercury Marine, 920-929-5000.



Livorsi DTS Control Architecture Drawing- Quad Engine

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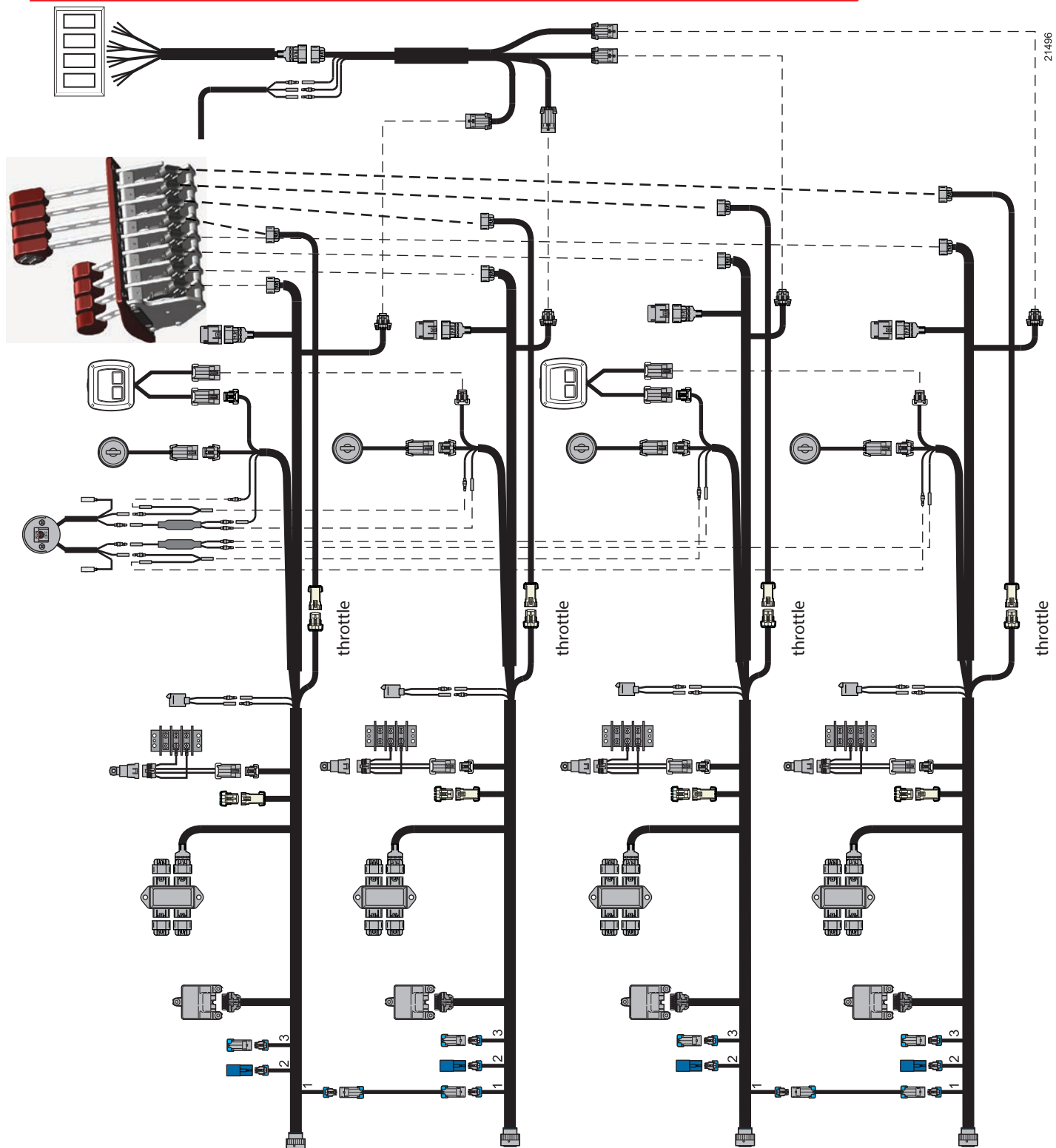
For Shadow Mode applications, please contact Livorsi Marine, 847.752.2700 for information.
For detailed instructions on how to install Shadow Mode for a three or four engine application, please contact Mercury Marine, 920-929-5000.



Livorsi DTS Control Architecture Drawing Quad Engine- OEM Supplied Trim Switches

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Overall Surface Area

Livorsi DTS Controls
Flat Base
Triple Engine (6 handle)

7 3/4 in. (197 mm)

Cutout Area

7 1/2 in. (90 mm)

5 1/8 in. (130 mm)

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8 in. (203 mm)



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www.livorsi.com info@livorsi.com

For installation and operation instructions, please visit www.livorsi.com/tools.htm



Livorsi DTS Controls
Flat Base
Triple Shift/Throttle



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Overall Surface Area

Livorsi DTS Controls
Flat Base
Quad Engine (eight handles)

7 3/4 in. (197 mm)

Cutout Area

9 13/16 in. (249 mm)

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10 5/16 in. (262mm)

Overall Surface Area

Cutout Area

5 1/8 in. (130 mm)

7 1/2 in. (190 mm)

7 3/4 in. (197 mm)

8 in. (203 mm)



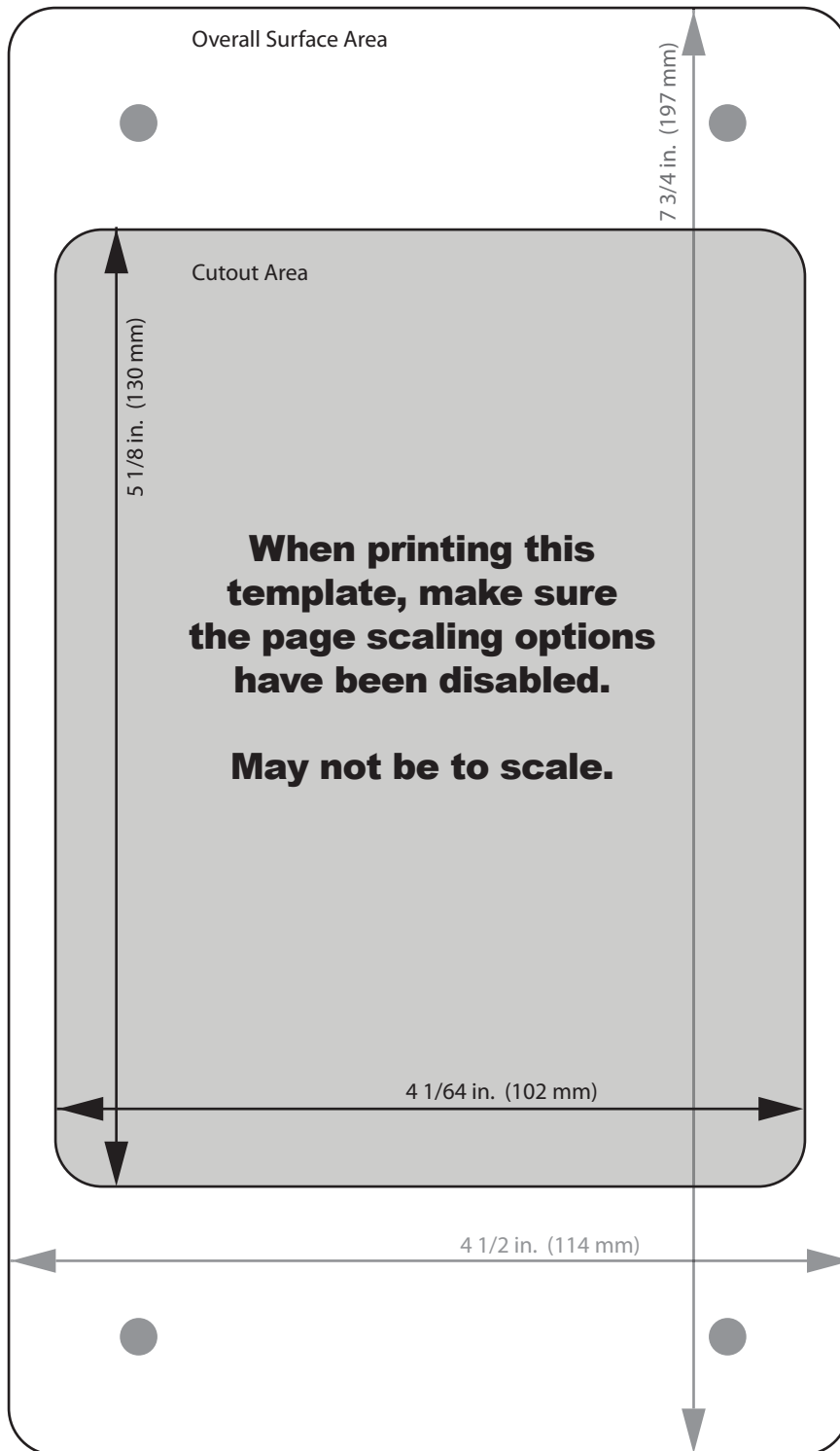
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Livorsi DTS Controls
Contour Base
Triple Engine (6 handle)



Livorsi DTS Controls
Contour Base
Triple Shift/Throttle (3 handle)



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Overall Surface Area

Livorsi DTS Controls
Contour Base
Quad Engine (8 handle)

7 3/4 in. (197 mm)

Cutout Area

5 1/8 in. (130 mm)

9 13/16 in. (249 mm)



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10 5/16 in. (262 mm)