

# Electrical System

## Section 4C - Instrumentation

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## Tools

### Kent-Moore Tools

Kent-Moore Tools, Inc. 29784 Little Mack Roseville, MI 48066 Phone: (313) 774-9500	
Description	Part Number
Connector Test Adapter Kit	J-35616-A

## Wire Color Code Abbreviations

Wire Color Abbreviations				
BLK	Black		BLU	Blue
BRN	Brown		GRY	Gray
GRN	Green		ORN or ORG	Orange
PNK	Pink		PPL or PUR	Purple
RED	Red		TAN	Tan
WHT	White		YEL	Yellow
LT or LIT	Light		DK or DRK	Dark

## Precautions

### WARNING

Performing service or maintenance without first disconnecting the battery can cause product damage, personal injury, or death due to fire, explosion, electrical shock, or unexpected engine starting. Always disconnect the battery cables from the battery before maintaining, servicing, installing, or removing engine or drive components.

**IMPORTANT:** It may be necessary to remove the instrument panel from the dashboard to gain access to instruments and switches. Do not allow wires to come in contact with metal or other wires.

**IMPORTANT:** When conducting tests using a heat source, be sure to follow all instructions of the manufacturer of the heat source.

## General Information

**IMPORTANT:** If all instrument readings appear suspicious, an electrical overload may have occurred. A fuse may be defective or a circuit breaker may be tripped open. Find and correct the cause before replacing the fuse or resetting the circuit breaker.

Before testing individual instruments, check the following:

- All wires in the circuit are connected.
- The plug-in connectors are fully engaged.
- The battery is fully charged.
- All connections are tight and corrosion-free.

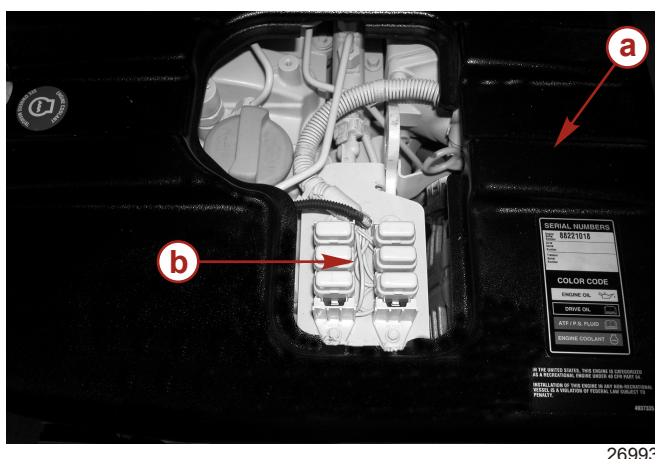
## Electrical Overload Protection

### Engine Electrical System Overload Protection

If an electrical overload occurs, a fuse will burn out (blow). Find and correct the cause for the electrical overload before replacing the fuse.

**NOTE:** In an emergency, when the engine must be operated and the cause for the electrical overload cannot be located and corrected, turn off or disconnect all the accessories connected to the engine and instrumentation wiring. Replace the blown fuse. If the replacement fuse also blows then the electrical overload has not been eliminated. Further checks must be made on the electrical system. **Do not circumvent the electrical overload protection provided on fused circuits by installing a higher amperage fuse or shorting across the fuse block terminals.** Contact your Cummins MerCruiser Diesel Authorized Repair Facility.

Fuses provide protection for the engine electrical system as indicated. The fuse panel is located beneath an access panel in the front of the engine cover.

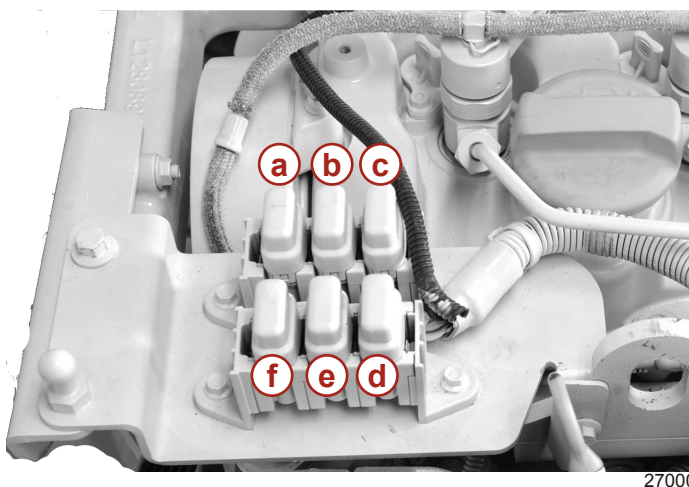


2.0 engine cover with access panel

**a** - Engine cover access panel

**b** - Fuse panel

After finding and correcting the cause of the overload, replace any burned out (blown) fuses.



2.0 fuse panel

Reference	Fuse	Protection	Location on fuse panel (From Front of Engine)
a	20-amp	Un-switched power to helm	Lower left
b	10-amp	Switched power to ECM	Middle left
c	10-amp	Keyed power to ECM	Upper left
d	5-amp	Power—diagnostic connector	Upper right
e	15-amp	ECM switched power to SIM	Middle right

f	15-amp	Switched power to ECM	Lower right
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Vessel Integration Panel (VIP) Overload Protection

The Vessel Integration Panel (VIP) contains 2 circuit breakers that help protect the engine harness, vessel sensor harness, and helm harness.



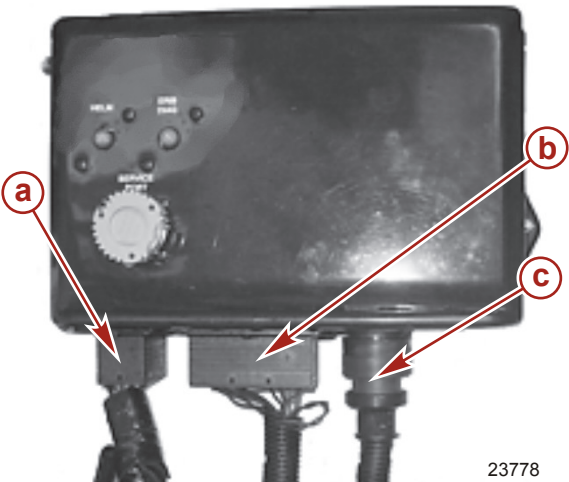
Vessel Integration Panel (VIP) circuit breakers

Reference	Circuit breaker rating	Protection	Location on fuse panel
a	5-amp	VIP Diagnostic	Left
b	10-amp	Helm	Right

Vessel Interface Panel (VIP)

Removal

- 1. Disconnect the vessel sensor harness from the VIP (24-pin connector).
- 2. Disconnect the engine to VIP harness from the VIP (40-pin connector).
- 3. Twist the locking ring and disconnect the 14-pin helm extension harness from the VIP.



Vessel Interface Panel (VIP)

- a - Vessel sensor harness connector
- b - Engine to VIP harness connector
- c - 14-pin helm extension harness connector

4. Remove the VIP mounting screws and remove the VIP.



VOP mounting screws (6 total, 2 not visible)

## Installation

The Vessel Interface Panel (VIP) is intended for mounting on the inner transom of the vessel in the engine compartment.

**IMPORTANT:** Mount the VIP with the connectors oriented downward, to the port or starboard side, or laid down. Do not mount the VIP with the connectors facing upward.

Consider the following if the VIP is mounted in a new location:

- it is in an accessible location.
- it is above the waterline at rest and is not near any moving parts.
- it is clear of deck water run-off and engine compartment water spray.
- the circuit breakers are easily accessible.
- it is in an area that is free of excessive heat and minimum 305 mm (12 in.) distance from all exhaust components.
- it allows a minimum of 229 mm (9 in.) of free space directly below the VIP for wire harness routing.
- it is not mounted directly or indirectly to the engine and is free from excessive vibration.

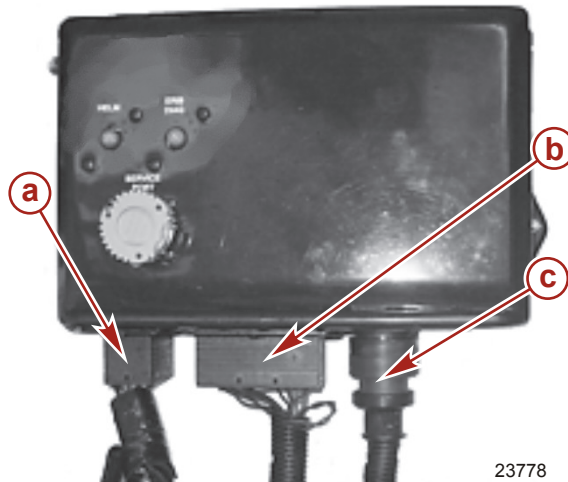
1. Mount the VIP using the mounting screws.



VOP mounting screws (6 total, 2 not visible)

2. Connect the vessel sensor harness to the VIP (24-pin connector).
3. Connect the engine to VIP harness to the VIP (40-pin connector).

4. Connect the 14-pin helm extension harness to the VIP and twist the locking ring into position.



**Vessel Interface Panel (VIP)**

- a** - Vessel sensor harness connector
- b** - Engine to VIP harness connector
- c** - 14-pin helm extension harness connector

## Extension Harness

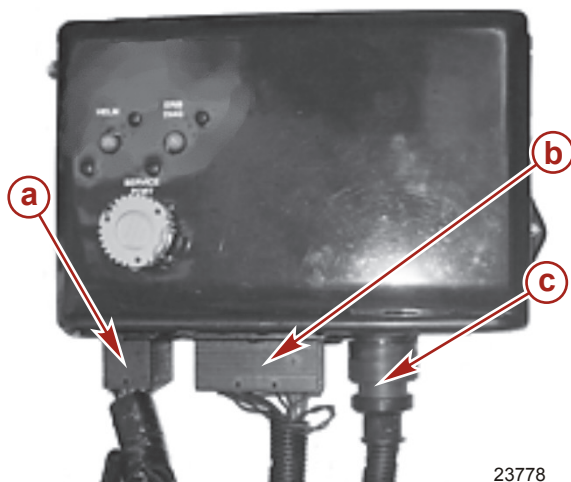
When routing any wiring harness to or from the engine compartment:

**IMPORTANT: Ensure that the harness can not be pinched or chaffed.**

- Confirm that all connectors are secure.
- Anchor the harness at least every 460 mm (18 in.) using appropriate fasteners.
- Minimize exposure to moisture.
- Install in a location away from hot or moving components.
- Install the harness following the most direct route possible to minimize voltage drop due to wire resistance.
- Protect the harness from sharp edges.



- Follow all ABYC guidelines that govern the installation of signal and DC power wiring in marine vessels.



Vessel Interface Panel (VIP)

- a** - Vessel sensor harness connector
- b** - Engine to VIP harness connector
- c** - 14-pin helm harness connector

## VesselView

### Important Information

The VesselView display is not field serviceable. If the VesselView is identified as the malfunctioning component, confirm operation with a properly functioning unit. Replace the VesselView if it is faulty.

Faulty units can be sent to Mototron for repair or exchange.

### Removal

1. Disconnect the battery cables.

**IMPORTANT:** Use care when working around or handling the VesselView so that the display screen is not scratched or damaged.

2. Disconnect the harness from the VesselView head unit.

**NOTE:** The VesselView bezel snaps on to the display face using plastic locking tabs. Use care during removal.

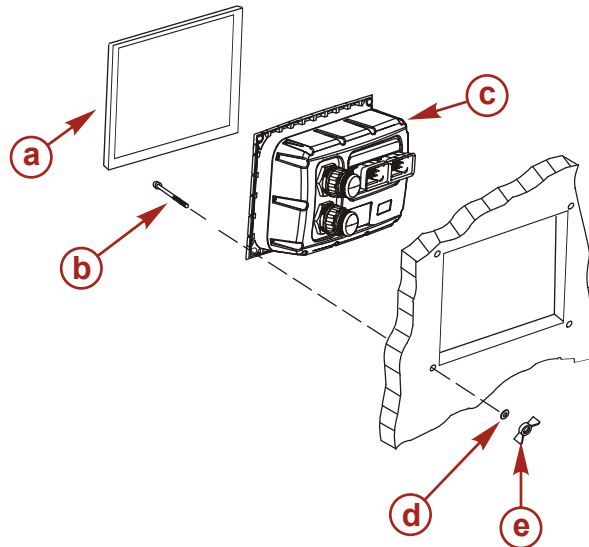
3. Carefully remove the VesselView bezel.
  - a. The VesselView has four access slots at the bottom of the bezel.

- b. Use a small plastic trim-stick (preferred) or an angled flat head screwdriver inserted into the slots to gently pry the bezel up. Start removal at the inner slots and work outward..



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- c. Continue working the slots until the bottom of the bezel is loose.
- d. Carefully pry up the sides of the bezel until the bezel releases.
4. Remove the four screws securing the VesselView to the vessel.



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- a** - Bezel
- b** - Mounting Screw
- c** - VesselView
- d** - Washer
- e** - Wing nut

5. Pull the VesselView out through the front of the panel opening to remove.

## Cleaning

Clean the VesselView screen with a soft cloth and mild soap and water. An abrasive cloth will scratch and damage the VesselView screen.

Clean the body and keypad of the VesselView with a soft cloth, a detailing brush, or a canned-air duster.

## Inspection

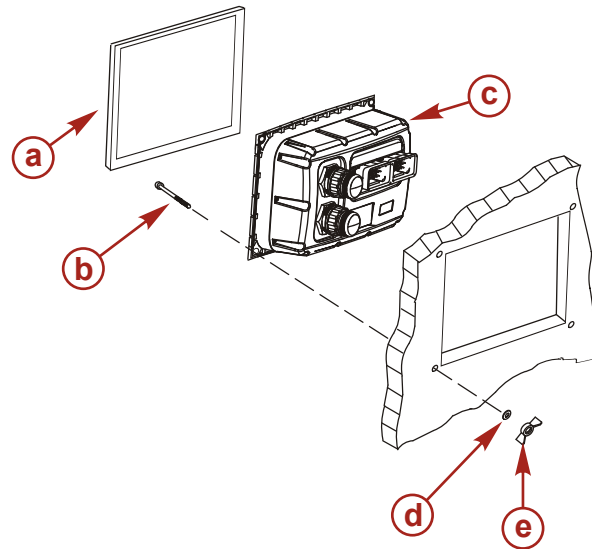
1. Inspect for screen damage.
2. Inspect for housing separation and exposed or protruding water seals.



3. Inspect the connector locks and electrical pins.
4. Inspect the keypad covers for perforations.
5. Replace or return a damaged VesselView for service.

## Installation

1. Insert the VesselView into the opening.



27059

- a** - Bezel
- b** - Mounting Screw
- c** - VesselView
- d** - Washer
- e** - Wing nut

2. Secure the VesselView with the four mounting screws, washers, and wing nuts. Do not overtighten the wing nuts.

3. The back of the bezel is labeled "TOP" and "BOTTOM".

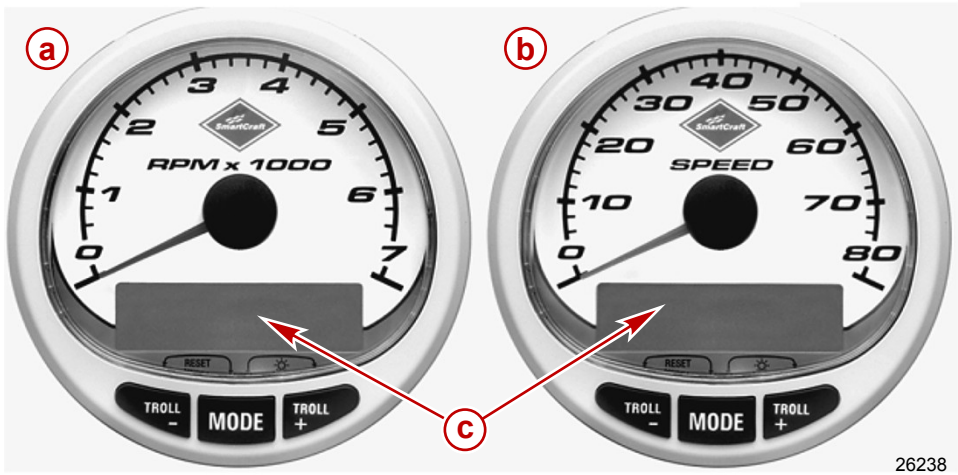
**NOTE:** Ensure the bezel is aligned correctly to avoid damaging the bezel or VesselView.

4. Snap the bezel onto the VesselView.

# SmartCraft Gauges

## Basic Operation

Refer to the appropriate Mercury MerCruiser SmartCraft documentation for additional diagnostics and troubleshooting information.

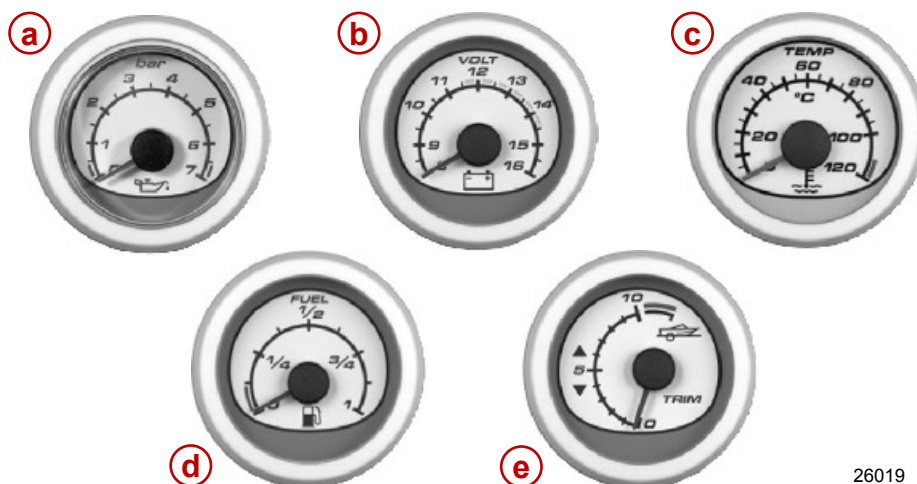


- a - System Tachometer (required)
- b - System Speedometer (optional)
- c - LCD display

- **Power up:** Gauges receive power when the ignition is turned on.
- **Lights:** The brightness and contrast are adjustable.
- **Buttons:** The "MODE" button is used for selecting information screens. The "+" and "-" buttons are for user input and setting gauge calibrations.
- **Troll Control:** Allows the operator to set and control the idle speed of the engine for trolling without using the throttle.
- **Engine Guardian System:** Monitors the critical sensors on the engine for any early indications of problems. The system will respond to a problem by reducing engine speed in order to maintain a safe operating condition.
- **Warning System:** The system will sound the warning horn and display the warning message.
- **Digital Display Screen:** Displays the following engine information.

SC1000 System Tachometer Display Screen (depending on engine type):	SC1000 System Speedometer Display Screen (depending on engine type):
Engine RPM	Speed
Engine Temperature	Trim and RPM Synchronizer
Engine Oil Pressure	Trip Odometer
Trim and RPM	Fuel Range
Trim and Water Pressure	Fuel Economy
Water Pressure	Instant and Average Fuel Economy
Battery Voltage and Engine Hours	Fuel Used
Fuel Flow and Fuel Used	Fuel Tank Levels
Depth	Oil Tank Levels
Engine Break-in	Fresh Water Tank Level

SC1000 System Tachometer Display Screen (depending on engine type):	SC1000 System Speedometer Display Screen (depending on engine type):
	Waste Water Tank Level
	Clock and Air/Sea Temp
	Distance and fuel to waypoint if waypoint programmed into optional GPS
	Optional GPS Input Display



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Optional System Link (gauges typical)

- a** - Oil pressure
- b** - Battery voltage
- c** - Water temperature
- d** - Fuel level
- e** - Trim

The System Link digital gauges are connected in series and receive their data from the System Tachometer.

## Removal

### 1. Tachometer and speedometer removal:

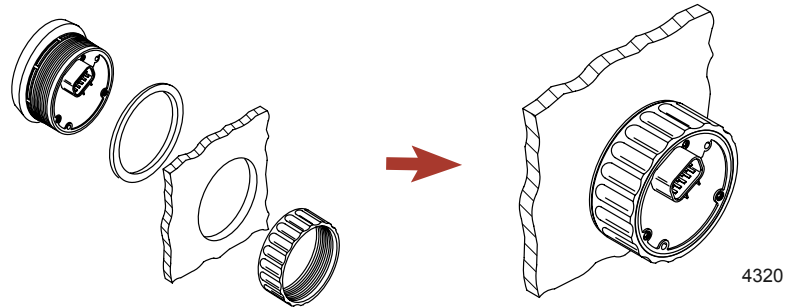
**NOTE:** Use care to not pull or stress any wiring attached the instrument panel during removal.

- a. Remove or gain access to the back of the instrument panel.
- b. Disconnect the harness connector from the back of the gauge.

**IMPORTANT:** Remove gauges by hand. The use of large jawed tools may damage the gauges.

- c. Support and hold the face of the gauge stationary during removal.

- d. Turn the retaining ring on the back of the gauge counterclockwise and remove it from the the gauge.



### System Tachometer or Speedometer panel installation

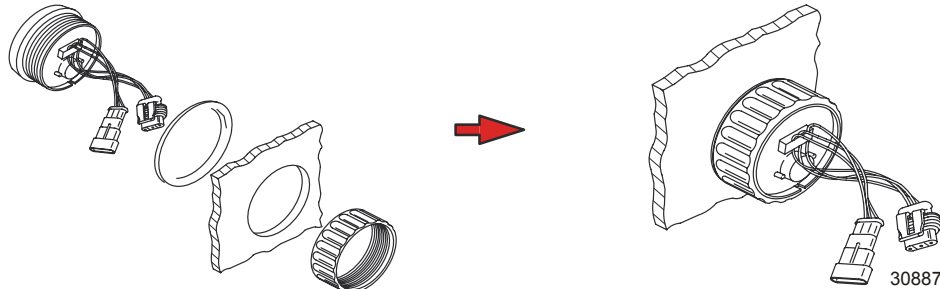
- e. Remove the gauge from the front of the instrument panel.
- f. Reassemble the loose gauge, seal, and retaining ring to keep the components together.

### 2. System Link gauge removal:

- a. Remove or gain access to the back of the instrument panel.
- b. Disconnect the harness connector from the back of the gauge.

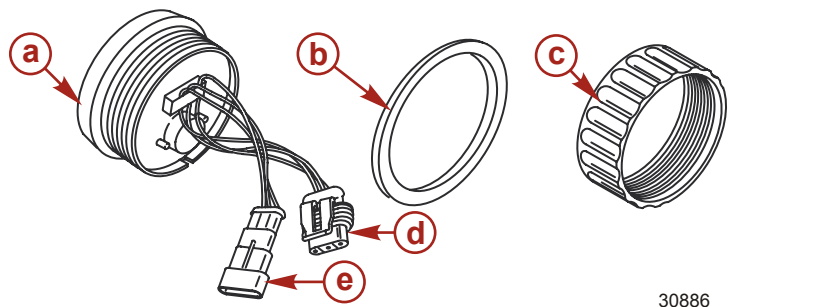
**IMPORTANT: Remove gauges by hand. The use of large jawed tools may damage the gauges.**

- c. Support and hold the face of the gauge stationary during removal.
- d. Turn the retaining ring on the back of the gauge counterclockwise and remove it from the the gauge.
- e. Remove the gauge from the front of the instrument panel.



### System Link gauge panel installation

- f. Reassemble the loose gauge, seal, and retaining ring to keep the components together.



**a** - System Link gauge

**b** - Seal

**c** - Retaining ring

**d** - Male connector

**e** - Female connector

## Cleaning

1. Clean the gauge lens with a soft cloth suitable for optical lens cleaning and mild soap and water.
2. Rinse and dry the lens completely to avoid water spots.
3. The System Tachometer and Speedometer keypad area can be cleaned with a soft cloth, a small detailing brush, and a canned-air duster.

## Inspection

1. Inspect the gauge for damaged electrical connectors or locks.
2. Inspect the gauge seal for excessive compression scarring and cuts or tears.
3. Inspect the gauge body threads for damage.
4. Inspect the retaining ring for cracks or damaged threads.
5. Repair or replace the gauge or components that prevent it from being secured to the instrument panel and remaining watertight.

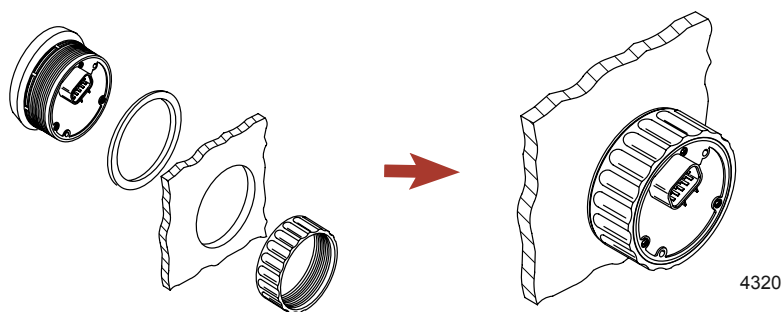
## Installation

1. Tachometer and speedometer installation:

**IMPORTANT:** Install gauges by hand. Applying uneven force or overtightening the retaining ring will damage the gauge.

**NOTE:** Use care to not pull or stress any wiring attached the instrument panel during installation.

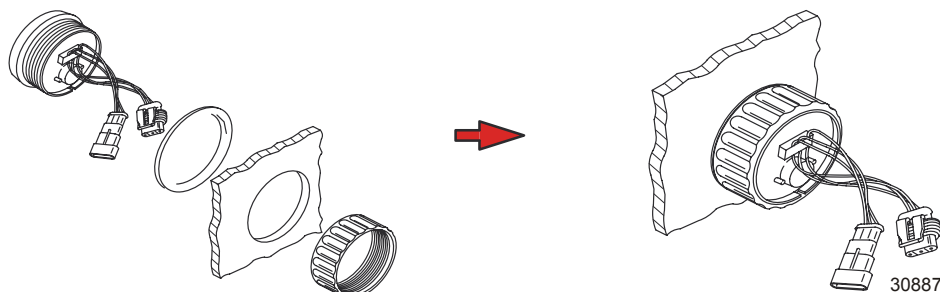
- a. Gain access to the back of the instrument panel.
- b. Remove the retaining ring from the back of the gauge.
- c. Confirm that the seal is properly positioned flat against the back of the gauge face.
- d. Insert the gauge through the front of the instrument panel.
- e. Support and hold the face of the gauge stationary.
- f. Turn the retaining ring on the back of the gauge clockwise until the seal is moderately compressed and the gauge is secure. Do not overtighten.



### System Tachometer or Speedometer panel installation

- g. Connect the harness connector to the back of the gauge.
- h. Reinstall the instrument panel (if removed).
2. System Link gauge installation:
  - a. Gain access to the back of the instrument panel.
  - b. Remove the retaining ring from the back of the gauge.
  - c. Confirm that the seal is properly positioned flat against the back of the gauge face.
  - d. Insert the gauge and wiring through the front of the instrument panel.
  - e. Support and hold the face of the gauge stationary.

- f. Turn the retaining ring on the back of the gauge clockwise until the seal is moderately compressed and the gauge is secure. Do not overtighten.



#### System Link gauge panel installation

- g. Connect the harness connectors. Weather cap the last unused connector.
- h. Reinstall the instrument panel (if removed).

### CAN Bus Testing

1. Turn off the vessel's main power.
2. Disconnect the harness being tested from the engine and any peripherals.
3. Measure resistance across connector pins "J" and "K" (WHT and BLU wires in the harness).
4. Measured resistance should be approximately 60 ohms.
5. A harness with either too little or excessive resistance will be unable to support a CAN data signal.
6. Repair or replace the harness as required.

### System Link Test

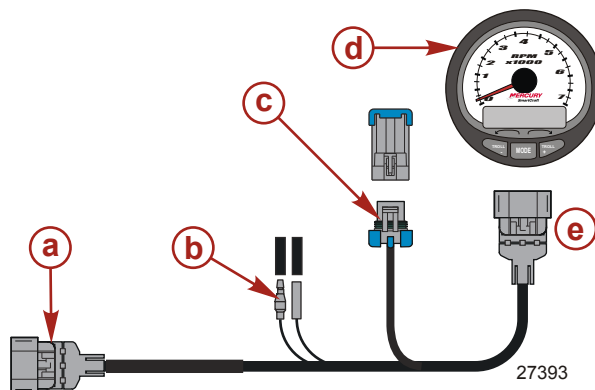
System link connector	Logic Probe	Wire Color	Color gauges
1	HI LED (12 volts DC positive)	PUR/WHT	Red
2	LO LED (ground)	BLK	Blue
3	HI/LO frequency (VDO data)	YEL (single), YEL/PUR (starboard), YEL/WHT (port)	Yellow



## SmartCraft Gauge Connections

### System Tachometer Harness

The System Tachometer receives its signal from the 14-pin helm harness CAN P (1) bus and is connected to a junction box with a SmartCraft 10-pin male-to-male harness. Each helm station has a System Tachometer will have one System Tachometer for each engine.

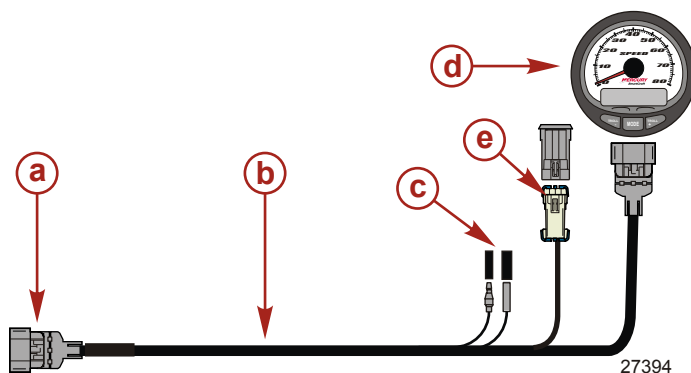


**System tachometer harness**

- a** - 10-pin junction box connector
- b** - Audio warning (weather cap)
- c** - Smart Link connector (weather cap)
- d** - System Tachometer
- e** - Gauge connector

### System Speedometer Harness

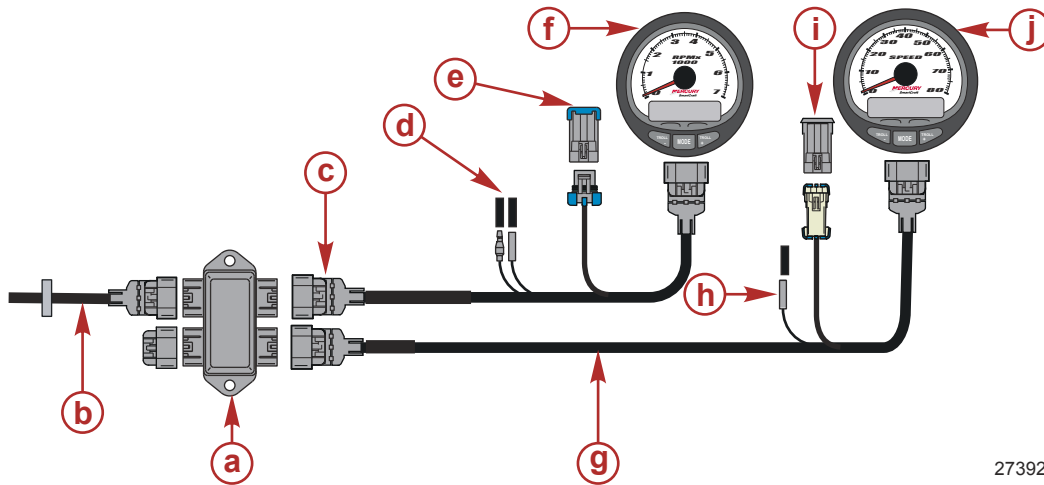
The System Speedometer receives its signal from the 14-pin helm harness CAN P (1) bus and is connected to a junction box with a SmartCraft 10-pin male-to-male harness. In single engine applications it is connected to the junction box. For multiple engine applications only one System Speedometer is connected to the junction box networked to the VIP and vessel sensor harness connected to the paddle wheel speed sensor. One System Speedometer can be installed at each helm.



- a** - 10-pin junction box connector
- b** - System speedometer harness
- c** - NMEA connectors
- d** - System speedometer
- e** - Temperature sensor connector

## SC1000 System Tachometer and Speedometer Installation (Single Engine)

In single engine applications the System Tachometer and Speedometer share a junction box connected to the helm harness. In single engine, dual helm applications, the System Tachometer and Speedometer connect through a junction box connected to each stations' helm harness.



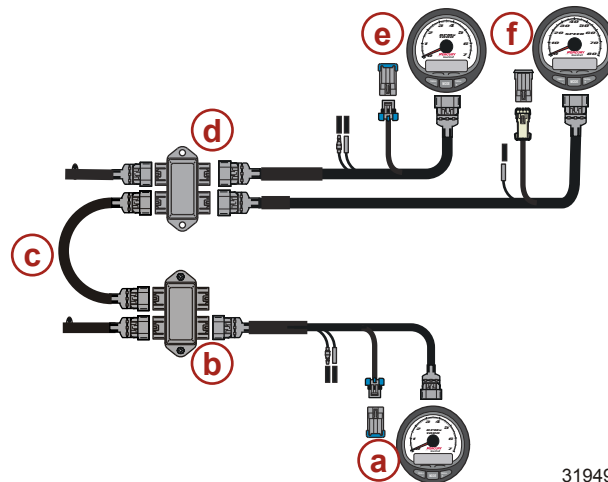
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### Single engine installation

- |  |   |
|--|---|
| <b>a</b> - Junction box                                  | <b>f</b> - System Tachometer                |
| <b>b</b> - 10-pin SmartCraft connector from helm harness | <b>g</b> - System Speedometer harness       |
| <b>c</b> - System tachometer harness                     | <b>h</b> - NMEA connector                   |
| <b>d</b> - Audio Warning                                 | <b>i</b> - Air temperature sensor connector |
| <b>e</b> - System Link Connector                         | <b>j</b> - System Speedometer               |

## Dual Engine Installation SC1000 System Tachometer and Speedometer

In dual engine applications there is a System Tachometer installed for each engine. They are connected to a junction box that is attached to each engine's helm harness. The System Speedometer is connected to the junction box networked to the VIP and vessel sensor harness connected to the paddle wheel speed sensor. For dual engine, dual helm applications this basic installation is repeated at the secondary helm.

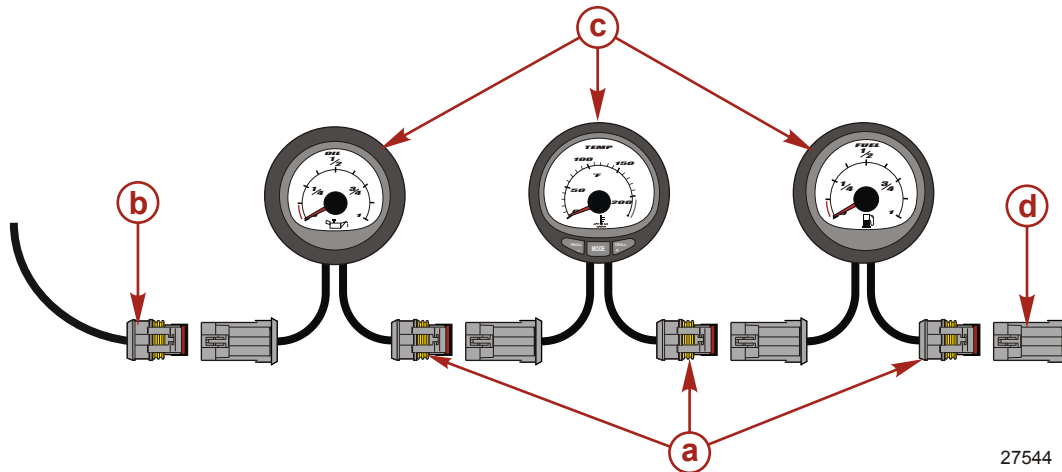


### Dual engine installation

- a** - Starboard engine tachometer and harness connection to junction box
- b** - Starboard engine helm harness connection to junction box
- c** - CAN P jumper harness
- d** - Port engine helm harness connection to junction box
- e** - Port engine tachometer and harness connection to junction box
- f** - System Speedometer and harness

## System Link Gauge Connections

System Link gauges are slaved off and receive their data signal from a master gauge, either a System Monitor, System Tachometer, or VesselView. This enables System Link gauges to be used in a variety of situations and in a wide range of configurations. The System Link gauges are linked together in series. The System Link connector of the final gauge in a series is sealed with a weather cap.

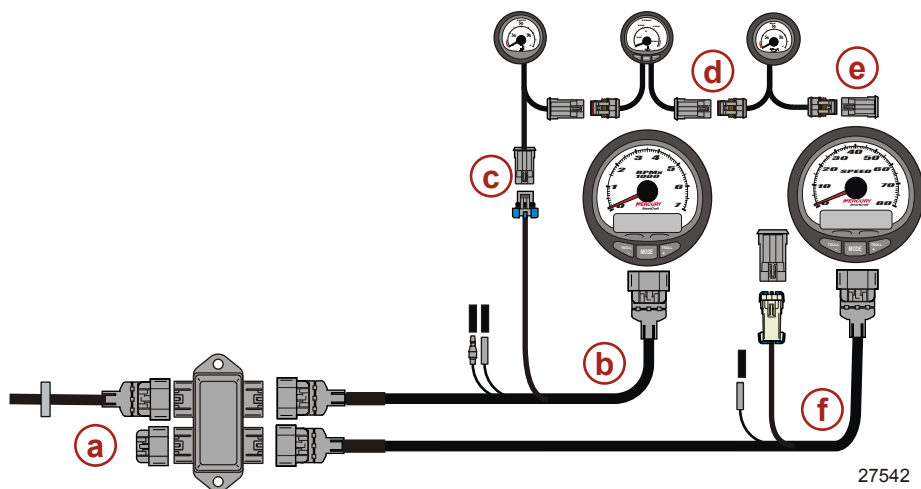


**System Link gauges (typical)**

- a** - System Link connectors in series
- b** - System Link connector to master gauge
- c** - System Link gauges
- d** - Weather cap

Each set of System Link gauges will monitor one engine. In multiple engine applications a System Link gauge set must be installed for each engine. In all cases the System Link gauges are connected to a master gauge connected to each engine's junction box. For multiple helm applications the secondary helm instrumentation will connect to the secondary helm harness in the same manner.

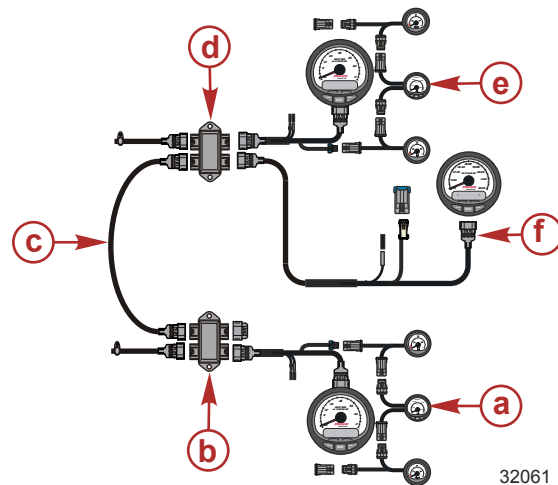
1. Single engine System Tachometer with System Link gauges.



**Single helm installation**

- a** - Junction box
- b** - System Tachometer harness
- c** - System Link connector
- d** - System Link gauges (typical)
- e** - Weather cap
- f** - System Speedometer and harness

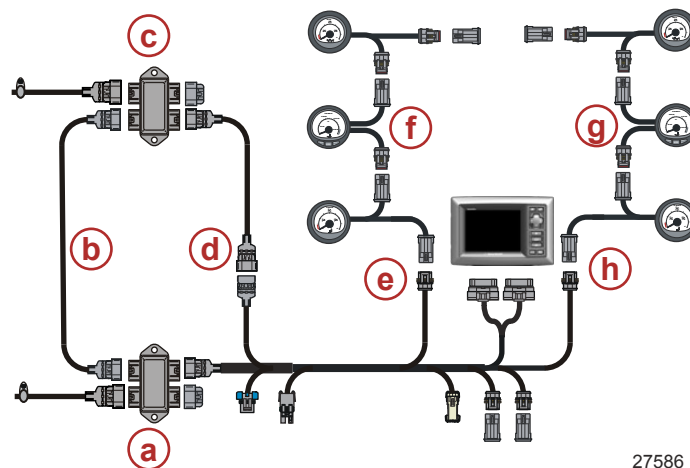
## 2. Dual engine System Tachometer with System Link gauges.



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- |  |   |
|--|---|
| <b>a</b> - Starboard System Link gauges  | <b>d</b> - Port engine junction box       |
| <b>b</b> - Starboard engine junction box | <b>e</b> - Port System Link gauges        |
| <b>c</b> - CAN P Jumper harness          | <b>f</b> - System Speedometer and harness |

## 3. VesselView with System Link gauges



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**Dual engine Vessel View with System Link gauges**

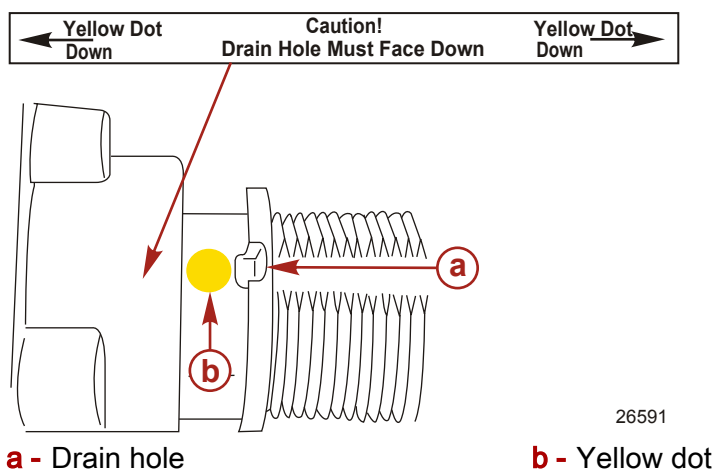
- |   |  |
|---|--|
| <b>a</b> - Starboard engine junction box            | <b>e</b> - Port System Link connector      |
| <b>b</b> - CAN P Jumper harness                     | <b>f</b> - Port System Link gauges         |
| <b>c</b> - Port engine junction box                 | <b>g</b> - Starboard System Link gauges    |
| <b>d</b> - 8-pin to 10-pin ignition adaptor harness | <b>h</b> - Starboard System Link connector |

## Primary Station Switches

### 4 Position Key Switch Mounting - With Bezel

1. Cut or drill a 54 mm (2-1/8 in.) diameter hole through the dashboard at the selected location.
2. Install the key switch housing assembly onto the key switch assembly.

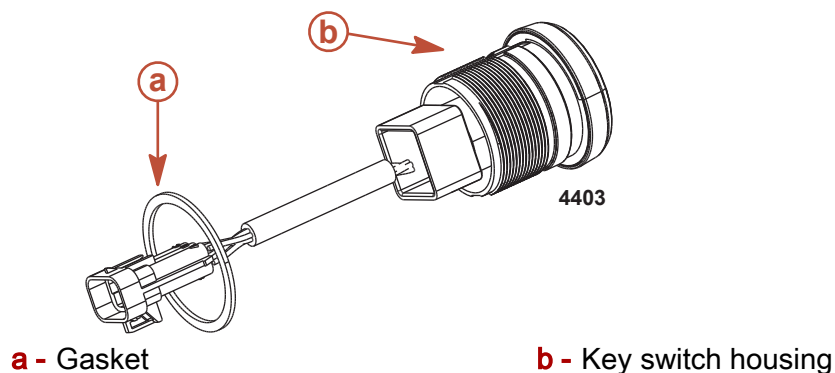
3. Align the upper notch of the key switch assembly and housing. Following the instructions on the decal, ensure the drain hole with the yellow dot points down for proper draining after installation.



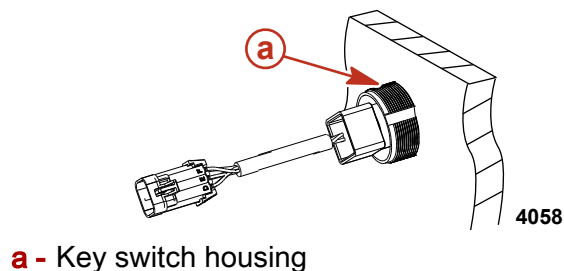
4. Install the key switch nut and tighten to the specified torque.

Description	Nm	lb. in.	lb. ft.
Key switch nut	2.2	20	

5. Install the cover and the bezel onto the key switch housing.  
6. Install the gasket onto the key switch housing.



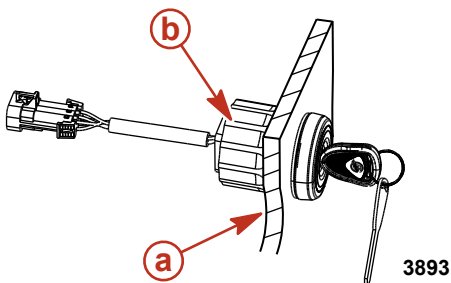
7. Insert the key switch assembly through the dash opening.



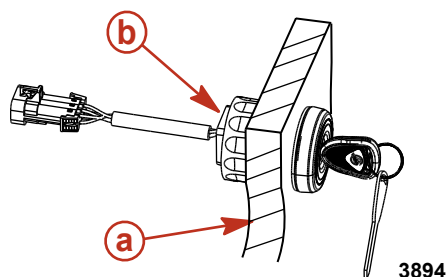
**NOTE:** The ring mounting nut is threaded so that it can be installed to fit a thick or thin dashboard.



8. Install the ring mounting nut, depending on dash thickness, so that the most threads are engaged when threaded onto the key switch housing.



- a** - Thin dashboard  
**b** - Ring mounting nut orientation



- a** - Thick dashboard  
**b** - Ring mounting nut orientation

9. Position the key switch properly in the dash.

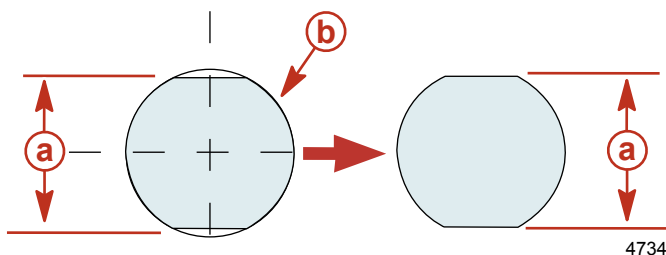
**NOTE:** The ring mounting nut must be tight so the assembly will not rotate during use.

10. Tighten the ring mounting nut securely.

11. Connect the key switch electrical connector to the command module harness.

#### 4 Position Key Switch Mounting - Without Bezel

1. Cut a 22.5 mm (7/8 in.) oblong shaped hole that matches the key switch assembly threaded end with the opposing top and bottom flat surfaces. The shape of the hole will keep the assembly from rotating during use.

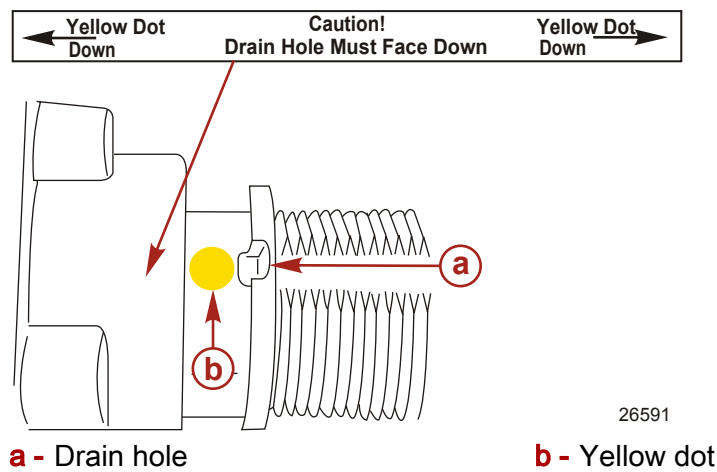


- a** - Distance between the flat surfaces - 20 mm (25/32 in.)  
**b** - Diameter of the hole - 22.5 mm (7/8 in.)

2. Install one nut onto the key switch assembly with the flat flange of the nut toward the key end of the switch. Thread this nut on as needed until the key switch will extend through the dashboard with enough threads exposed for the second nut to be installed.

**IMPORTANT:** There are two notches in the key switch assembly. The notch with white plastic showing and the yellow dot next to it is a drain hole. To properly drain the key switch, this notch must point down when installed.

3. Install the key switch assembly into the dashboard oblong hole. Following the instructions on the decal, ensure the drain hole with the yellow dot points down for proper draining after installation.

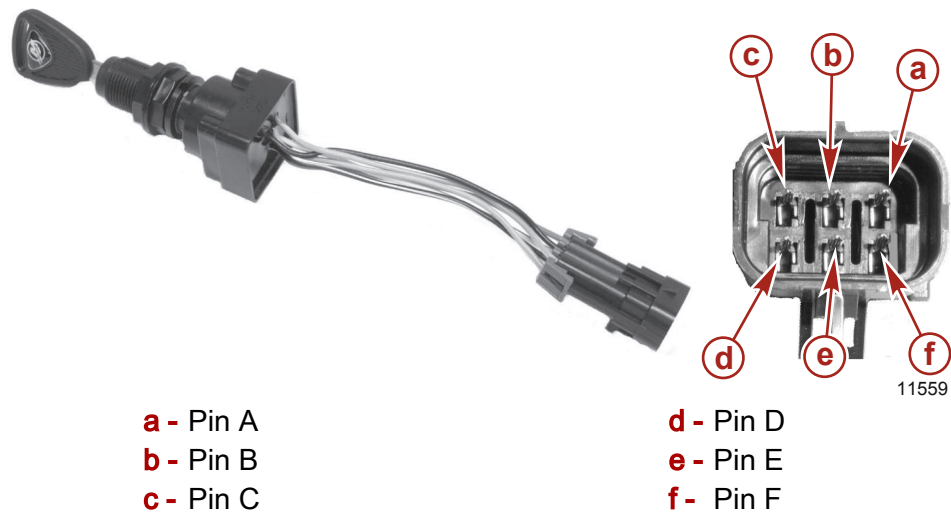


4. Install the second key switch nut and tighten to the specified torque.

Description	Nm	lb. in.	lb. ft.
Key switch nut	2.2	20	

5. Connect the key switch electrical connector to the command module harness.

Four Position Key Switch Test



Ref. No.	Pin	Wire Color	Description
a	A	Red	12 volts
b	B	Black	Ground
c	C	Purple/white	Accessory
d	D	Purple	Run
e	E	Black/yellow	Stop
f	F	Yellow/red	Start

Meter Test Leads		Key Position	Reading (Ω)
Red	Black		
Pin B	Pin E	Off	Continuity

Meter Test Leads		Key Position	Reading ( $\Omega$ )
Pin A	Pin C	Accessories	Continuity
Pin A	Pin F	Run	Continuity
Pin A	Pin C		
Pin A	Pin F	Start	Continuity
Pin F	Pin D		Continuity
Pin A	Pin D		Continuity
Pin A	Pin C		Continuity

## Start-Stop Panel Installation

The Start-Stop Panel allows the operator to start and stop the engines with the press of a single button. For the Start-Stop Panel to function, the key switch must be in the ON position. A start-stop switch is optional at the main helm station. A start-stop switch is required at the second helm station where no key switches are installed. Each engine is controlled independently in dual engine applications.



28082

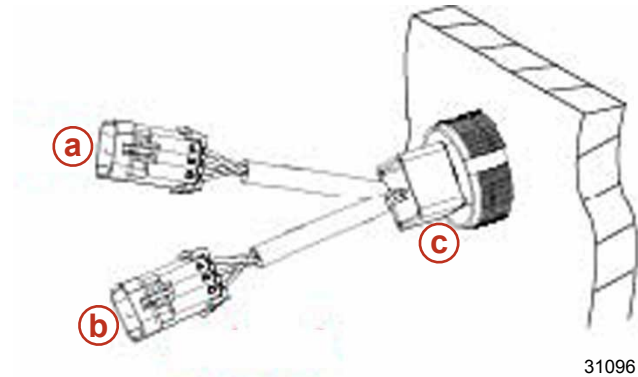
Dual engine start-stop switch

### WARNING

Performing service or maintenance without first disconnecting the battery can cause product damage, personal injury, or death due to fire, explosion, electrical shock, or unexpected engine starting. Always disconnect the battery cables from the battery before maintaining, servicing, installing, or removing engine or drive components.

1. Ensure battery cables are disconnected.

2. Insert the Start-Stop Panel electrical connector, wiring, and Start-Stop Panel housing through the dash opening.



**Behind the dashboard or instrument panel**

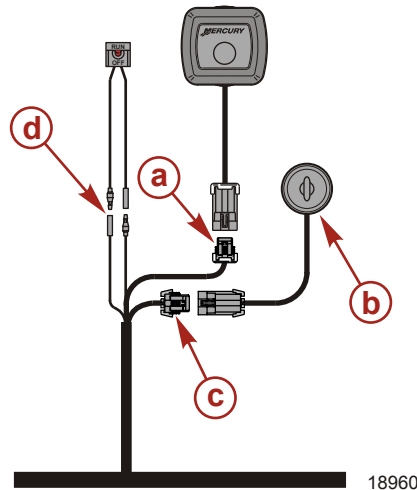
- a** - Port connector
- b** - Starboard connector
- c** - Back of switch housing

**NOTE:** The mounting nut is designed so that it can be reversed to maximize thread engagement depending on the thickness of the mounting surface.

3. Install the mounting nut to engage the maximum number of threads.
4. Correctly orientate the Start-Stop Panel.
5. Tighten the mounting nut securely.
6. Connect the Start-Stop Panel electrical connectors to their respective "START/STOP" connections on the helm harness.

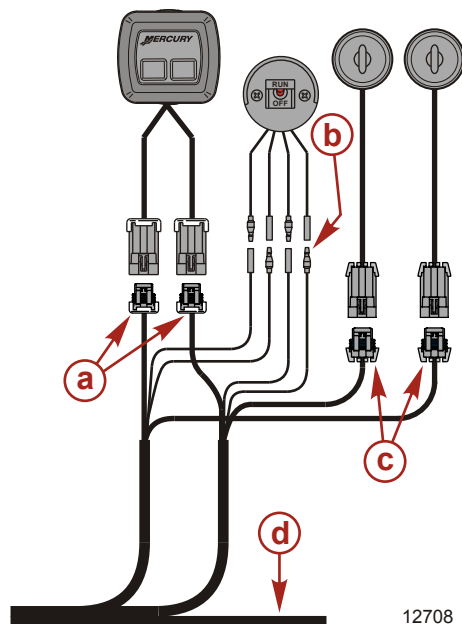
## Start-Stop Switch Wiring

**IMPORTANT:** In dual helm applications, a start-stop switch is optional at the main helm station. The second helm station requires a start-stop switch. Seal the second station ignition key switch connector with a weathercap.



**Single engine applications**

- a** - Start-stop switch connector
- b** - Ignition key switch
- c** - Ignition key switch connector (weather cap at helm 2)
- d** - Lanyard stop switch connectors



Dual engine applications

- |  |   |
|--|---|
| <b>a</b> - Start-stop switch connector   | <b>c</b> - Ignition key switch connector<br>(weather cap at helm 2) |
| <b>b</b> - Lanyard stop switch connector | <b>d</b> - Helm harness   |

## Engine and Helm Configuration

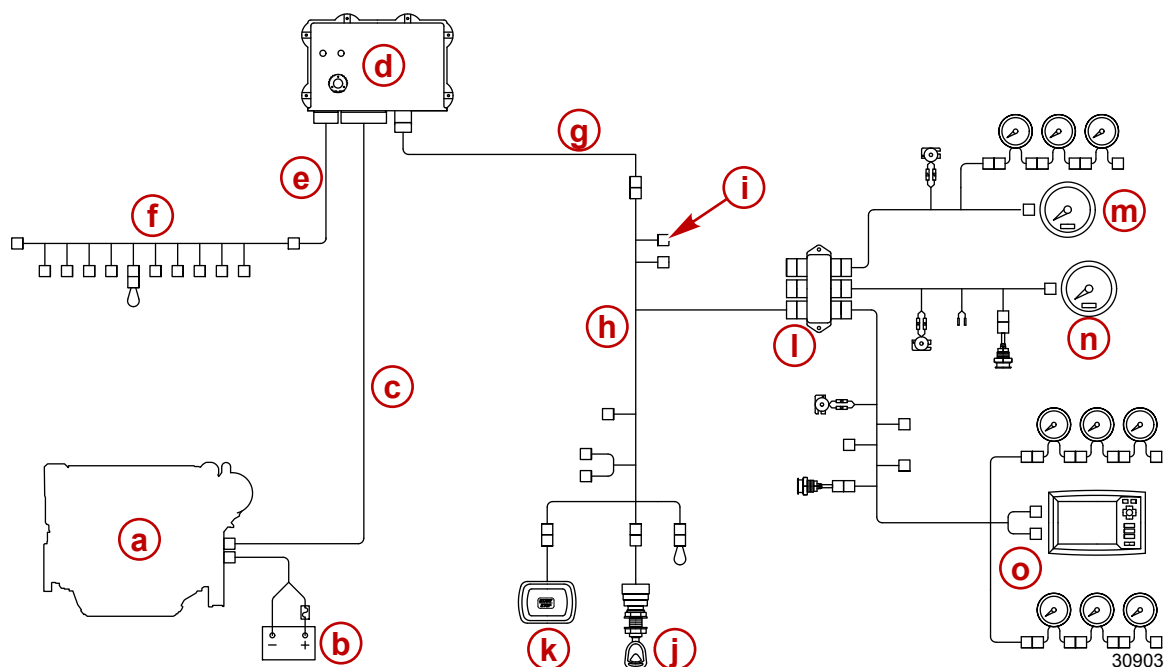
**IMPORTANT: Connectors must be fully engaged and secure.**

1. Connect and tighten the threaded collars of the helm extension harnesses and second station T harness, if equipped, and the non-DTS helm harnesses.
2. Connect the second station instrument harness or extension harness to the Y-harness connector tagged or titled "2nd STATION".
3. Connect the primary station instrument harness or extension harness to the Y-harness connector tagged or titled "MAIN STATION".
4. Connect the extension harness from the engine harness to the Y-harness connector tagged or titled "ENGINES"

**IMPORTANT: When routing any wiring harness, ensure that the harnesses do not rub or get pinched.**

5. Secure the harnesses to the boat at least every 460 mm (18 in.) using appropriate fasteners.

## Single Engine—Single Helm

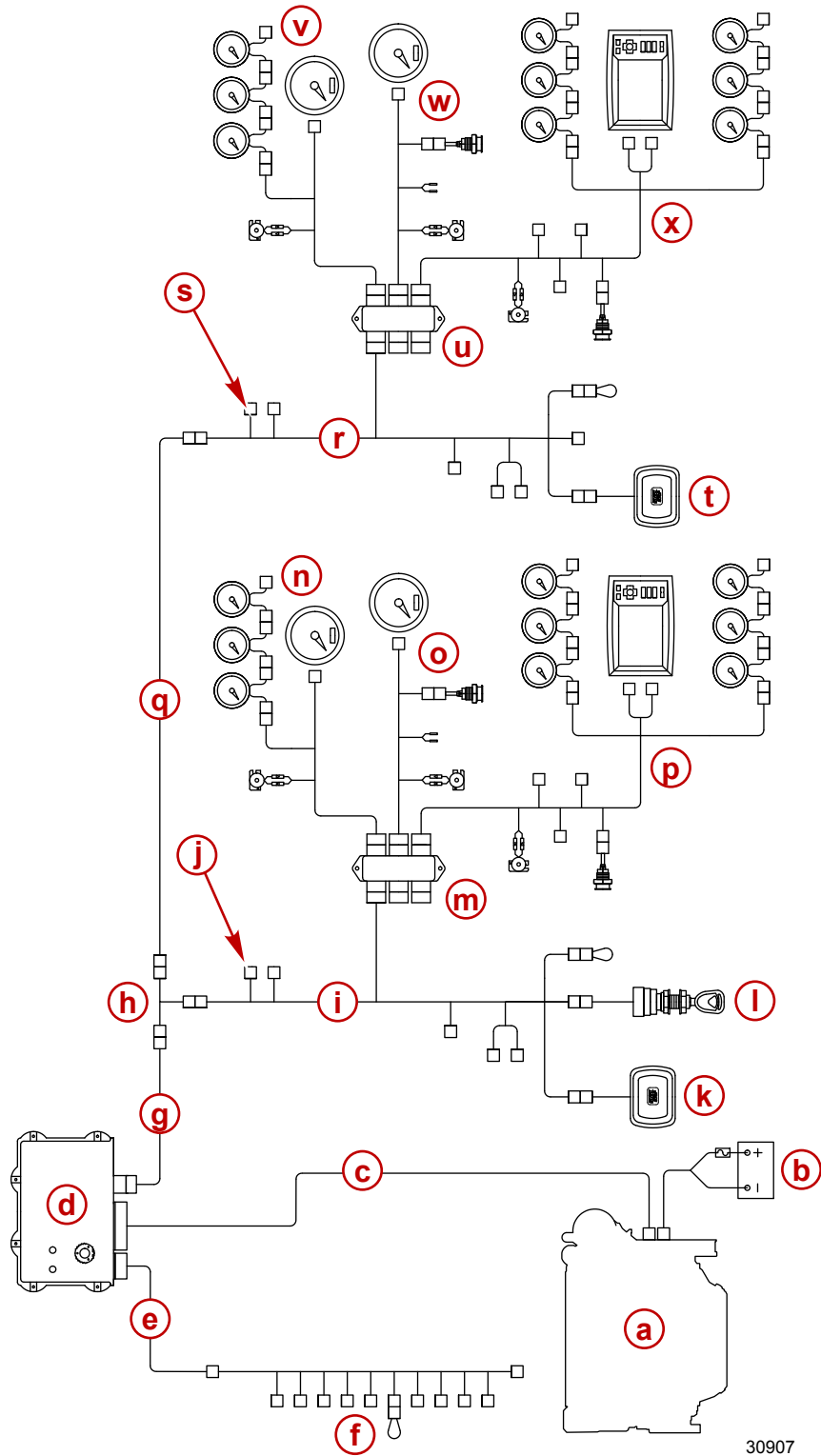


Reference	Description
a	Engine
b	Battery and power harness
c	Engine to VIP extension harness
d	Vessel Interface Panel (VIP)
e	Vessel sensor extension harness (if equipped)
f	Vessel sensor harness
g	14-pin helm extension harness
h	Non-DTS helm harness
i	CAN P termination resistor
j	Key switch
k	Start-stop panel (if equipped)
l	Junction box
m	System tachometer, harness, and link gauges
n	System speedometer and harness (if equipped)
o	VesselView display and harness (if equipped)



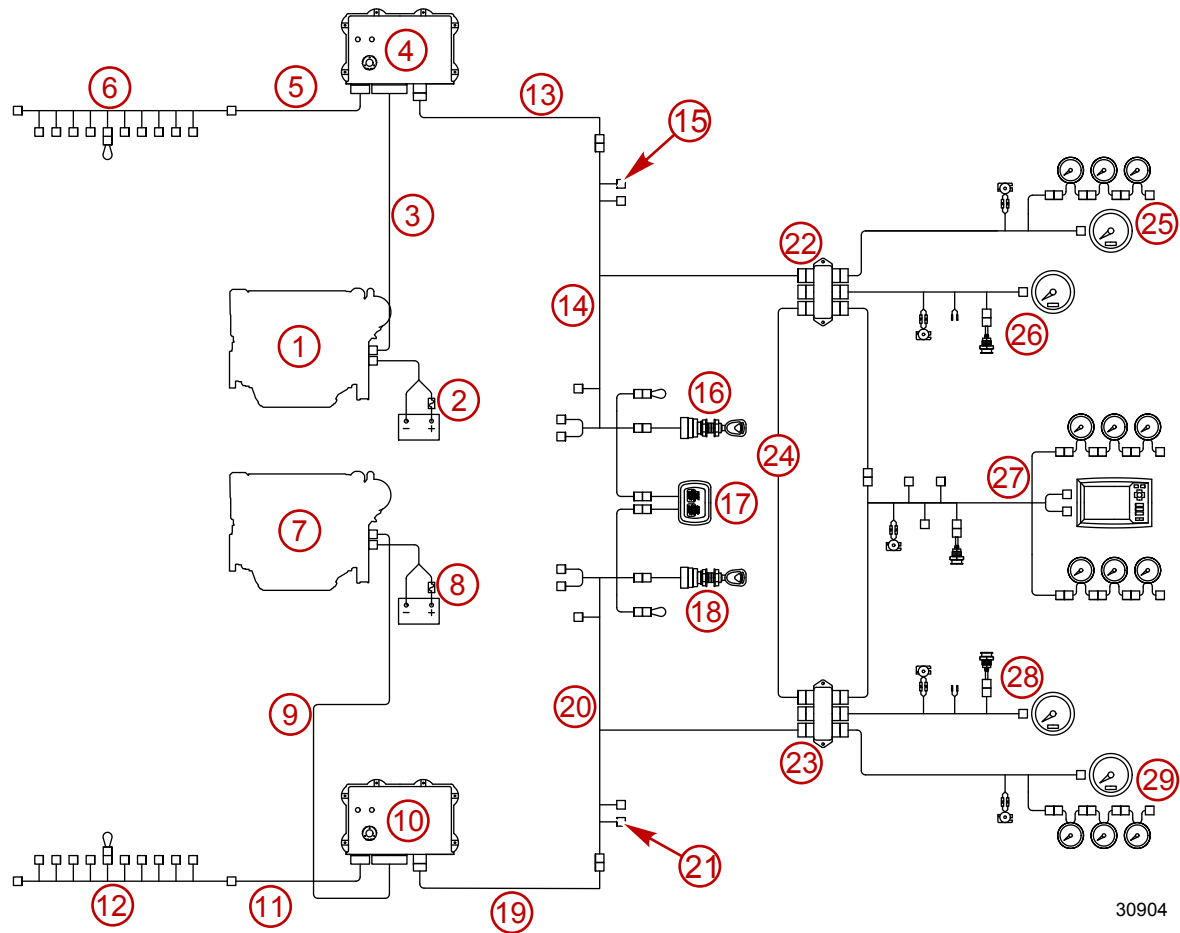
Notes:

## Single Engine—Dual Helm



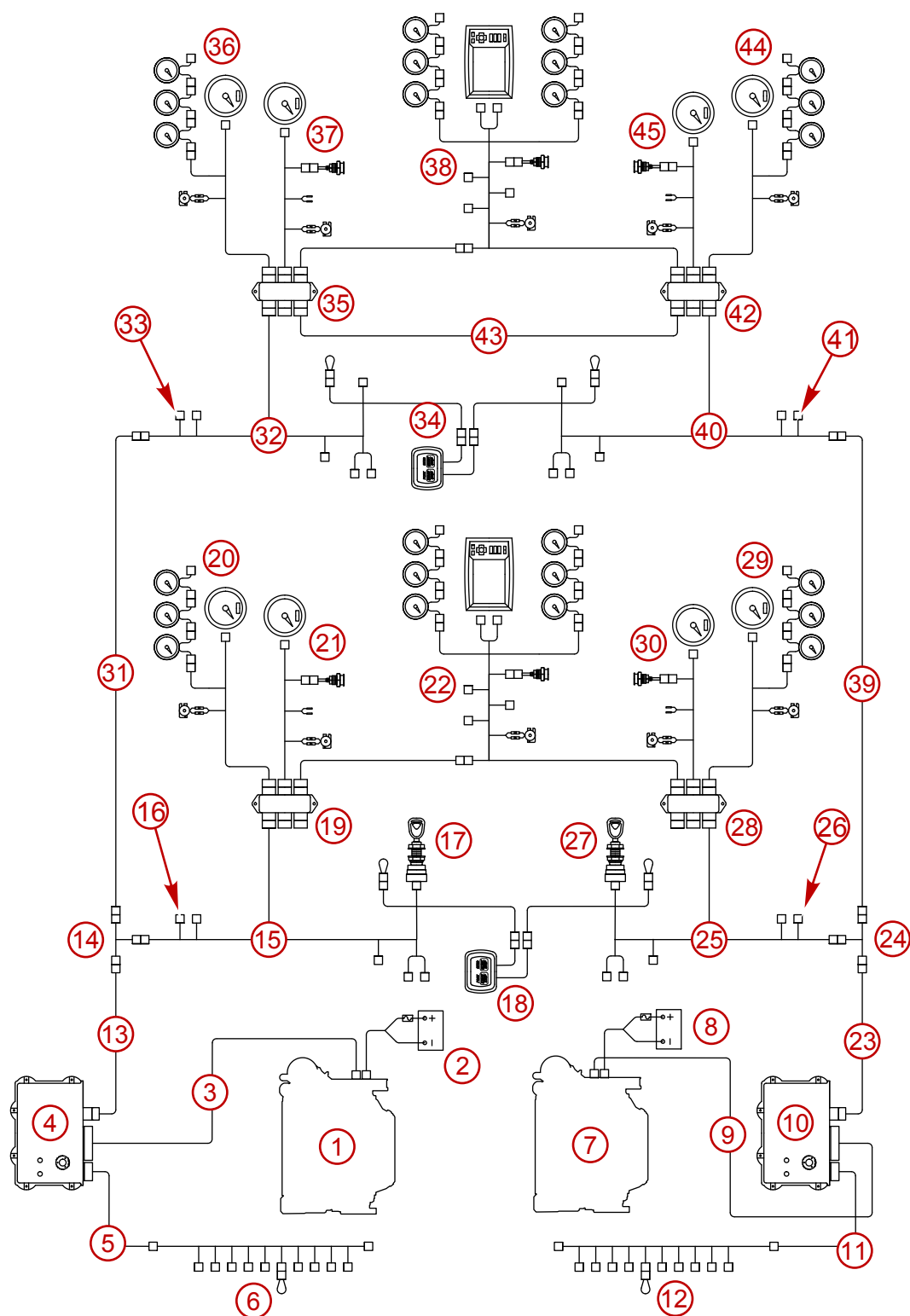
Reference	Description
a	Engine
b	Battery and power harness
c	Engine to VIP extension harness
d	Vessel Interface Panel (VIP)
e	Vessel sensor extension harness (if equipped)
f	Vessel sensor harness
g	14-pin helm extension harness
h	Second station adaptor harness
i	Primary station non-DTS helm harness
j	Primary station CAN P terminal with weather cap
k	Primary station start-stop panel (if equipped)
l	Primary station key switch
m	Primary station junction box
n	Primary station system tachometer, harness, and link gauges
o	Primary station system speedometer and harness (if equipped)
p	Primary station VesselView display and harness (if equipped)
q	Secondary station helm extension harness
r	Secondary station non-DTS helm harness
s	Secondary station CAN P termination resistor
t	Secondary station start-stop panel (if equipped)
u	Secondary station junction box
v	Secondary station system tachometer, harness, and link gauges
w	Secondary station system speedometer and harness (if equipped)
x	Secondary station VesselView display and harness (if equipped)

## Dual Engine—Single Helm



Reference	Description
1	Port side engine
2	Port engine battery and power harness
3	Port engine to VIP harness
4	Port engine VIP
5	Port vessel sensor extension harness (if equipped)
6	Port vessel sensor harness
7	Starboard engine
8	Starboard engine battery and power harness
9	Starboard engine to VIP harness
10	Starboard engine VIP
11	Starboard vessel sensor extension harness (if equipped)
12	Starboard vessel sensor harness
13	Port engine 14-pin helm extension harness
14	Port engine non-DTS helm harness
15	CAN P connector with weather cap
16	Port engine key switch
17	Start-stop panel (if equipped)
18	Starboard engine key switch
19	Starboard engine 14-pin helm extension harness
20	Starboard engine non-DTS helm harness
21	CAN P terminal with weather cap
22	Port engine junction box
23	Starboard engine junction box
24	CAN P crossover harness
25	Port engine system tachometer, harness, and link gauges
26	Port engine system speedometer and harness (if equipped)
27	VesselView display and harness (if equipped)
28	Starboard engine system speedometer and harness (if equipped)
29	Starboard engine system tachometer, harness, and link gauges

## Dual Engine—Dual Helm



30908

Reference	Description
1	Port engine
2	Port engine battery and power harness
3	Port engine to VIP harness
4	Port engine VIP



Reference	Description
5	Port vessel sensor extension harness (if equipped)
6	Port vessel sensor harness
7	Starboard engine
8	Starboard engine battery and power harness
9	Starboard engine to VIP harness
10	Starboard engine VIP
11	Starboard vessel sensor extension harness (if equipped)
12	Starboard vessel sensor harness
13	Port engine 14-pin helm extension harness
14	Port engine second station adaptor harness
15	Port engine primary station non-DTS helm harness
16	Port engine primary station CAN P connector with weathercap
17	Port engine primary station key switch
18	Primary station start-stop panel (if equipped)
19	Port engine primary station junction box
20	Port engine primary station system tachometer, harness, and link gauges
21	Port engine primary station system speedometer and harness (if equipped)
22	Primary station VesselView display and harness (if equipped)
23	Starboard engine 14-pin helm extension harness
24	Starboard engine second station adaptor harness
25	Starboard engine primary station non-DTS helm harness
26	Starboard engine primary station CAN P connector with weathercap
27	Starboard engine primary station key switch
28	Starboard engine primary station junction box
29	Starboard engine primary station system tachometer, harness, and link gauges
30	Starboard engine primary station system speedometer and harness (if equipped)
31	Port engine secondary station 14-pin helm extension harness
32	Port engine secondary station non-DTS helm harness
33	Port engine secondary station CAN P connector with weathercap
34	Secondary station start-stop panel (if equipped)
35	Port engine secondary station junction box
36	Port engine secondary station system tachometer, harness, and link gauges
37	Port engine secondary station system speedometer and harness (if equipped)
38	Secondary station VesselView display and harness (if equipped)
39	Starboard engine-secondary station 14-pin helm extension harness
40	Starboard engine-secondary station non-DTS helm harness
41	Starboard engine-secondary station CAN P connector with weathercap
42	Starboard engine-secondary station junction box
43	Secondary station CAN P crossover harness
44	Starboard engine-secondary station system tachometer, harness, and link gauges
45	Starboard engine-secondary station system speedometer and harness (if equipped)

## Remote Control Neutral Start Safety Circuit

### ⚠ WARNING

Starting the engine with the drive in gear can cause serious injury or death. Never operate a boat that does not have a neutral-safety-protection device.

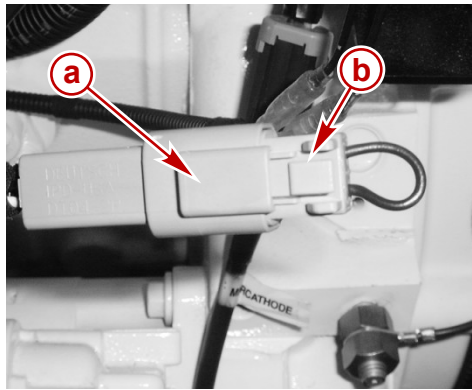
The neutral safety switch connection prevents the engine from starting while the remote control is in either the forward or reverse gear.

### Primary Station

### ⚠ WARNING

Improperly installing the remote control can result in serious injury or death. Always remove the jumper plug from the neutral safety connection on the engine and install it correctly to the remote control.

1. Disconnect the jumper plug from the neutral safety switch connector located on the engine if necessary.

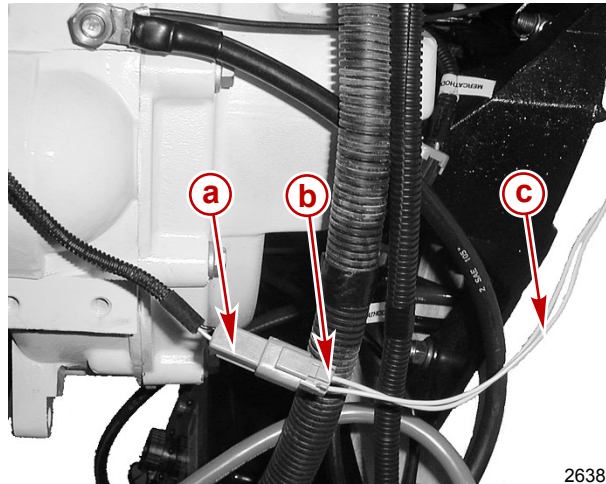


26382

- a** - Neutral safety switch connector
- b** - Jumper plug

2. Install a proper connector to the neutral switch wires leading to the remote control.

3. Connect the neutral switch wires from the remote control to the neutral safety switch connector on the engine.



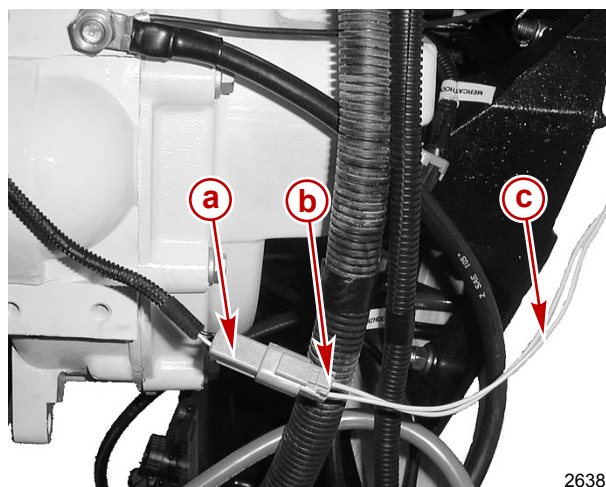
Typical

- a - Neutral safety switch connector
- b - Proper connector for wires from the remote control
- c - Neutral switch wires leading to the remote control

## Secondary Station

**IMPORTANT:** The remote control neutral safety wires from the secondary station remote control must be wired in series with the primary station remote control and neutral safety switch connection on the engine for the neutral safety feature to function properly.

1. Route the neutral safety switch wires from the second station remote control to the primary station remote control.
2. Connect the output wire from the second station remote control to the input wire on the primary station remote control.
3. Connect the neutral switch wires from the remote control to the neutral safety switch connector on the engine.



Typical

- a - Neutral safety switch connector
- b - Proper connector for wires from the remote control
- c - Neutral switch wires leading to the remote control

# Engine Monitoring Features

## Audio Warning System

Your Cummins MerCruiser Diesel power package may be equipped with an audio warning system. The audio warning system will not protect the engine from damage. It is designed to warn the operator that a problem has occurred.

The audio warning system will sound if the Engine Control Module (ECM) detects a malfunction. Your power package may be equipped with one of the following system views that can be used to indicate the fault codes.

- System Tachometer or Speedometer

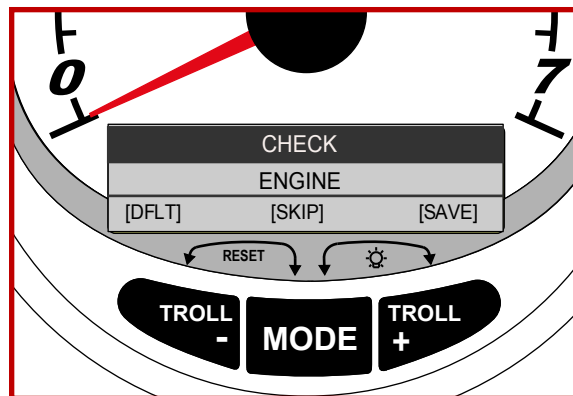
### NOTICE

**A continuous horn indicates a critical fault. Operating the engine during a critical fault can damage components. If the warning horn emits a continuous beep, do not operate the engine unless avoiding a hazardous situation.**

If the alarm sounds, stop the engine immediately if you are not in a hazardous situation. Investigate the cause and correct it, if possible. If you cannot determine the cause, consult your Cummins MerCruiser Diesel Authorized Repair Facility.

## System Tachometer or Speedometer

The LCD on the system tachometer, if equipped, displays active fault codes. To indicate an active fault code is present the following screen appears on the tachometer display.



25991

Typical system tachometer fault code display

After pressing the "MODE" button, a blinking "AL" also appears in the upper right hand corner of each menu on the digital display screen to signify an active fault. A major fault is also accompanied by the audio warning system.

To view the active faults, you must press the "MODE" button until you reach the total engine hours screen. In the event of an active fault code, the total engine hours is only displayed for 30 seconds after key-on. After this 30-second period, the digital display screen outputs the active fault codes in 3-second intervals in place of the total engine hour value.

The following is a list of faults displayed by the Smart Tach that also activates the audio warning system.

Smart Tach Display	Warning Indication
"LOW OIL PRESS"	The oil pressure has dropped below the critical engine protection limit
"OVERHEAT"	The engine coolant temperature has risen above the engine protection limit.
"WATER IN FUEL"	Water has been detected in the fuel filter housing.
"FAULT THROTTLE"	There is a fault in the throttle sensor.
"FAULT BATTERY"	The ECM battery voltage is out of range.
"CHECK ENGINE"	The "CHECK ENGINE" code corresponds to a number of different engine related faults. Refer to your Cummins MerCruiser Diesel Authorized Repair Facility.

## Senders

**NOTE:** Refer to Section 5 for information on the engine coolant temperature (ECT) and engine oil pressure (EOP) sensors.

**NOTE:** Refer to the appropriate Mercury MerCruiser sterndrive service manual for information on the trim pump sender, steering angle sender, and paddle wheel speed sender.

Notes: