# MERCATHODE SYSTEM MERCRUISER AND MERCURY RACING—ALPHA AND BRAVO DRIVES

**IMPORTANT: This document guides our dealers, boatbuilders, and company service personnel in the proper installation or service of our products. If you have not been trained in the recommended servicing or installation procedures for these or similar Mercury Marine products, have the work performed by an authorized Mercury Marine dealer technician. Improper installation or servicing of the Mercury product could result in damage to the product or personal injury to those installing or operating the product. Always refer to the appropriate Mercury Marine service manual for component removal and installation instructions.**

***NOTE: After completing installation, place these instructions with the product for the owner's future use.***

## Components Contained in Kit

| Qty. | Description | Part Number |
|---|---|---|
| 1 | Anode assembly | NSS |
| 1 | MerCathode controller | 8M0100517 |
| 1 | Harness | 865181T01 |
| 1 | Connector | NSS |
| 1 | Connector cap | NSS |

### Contents of Parts Bag

| Qty. | Description | Part Number |
|---|---|---|
| 2 | Stainless steel washer | 29245 |
| 2 | Screw (0.250-20 x 1.375 in.) | 69067 |
| 2 | Lockwasher | 26992 |
| 1 | 5-amp fuse harness | 18541A1 |
| 1 | 10-32 hex head screw | 805565 |
| 1 | Mounting stud | 805459 |
| 3 | 10-32 locknut | 46438 |
| 4 | 10-32 nut | 68219 |
| 2 | Stainless steel screw | 96113 |
| 2 | Washer | 21273 |
| 1 | Pan head screw | 72202 |
| 4 | Cable tie | 69355 |
| 2 | Plastic cap | 44574T |

## MerCathode System Installation

### MerCathode Controller Mounting

**⚠ WARNING**

**Before working around electrical system components, disconnect the battery cables from the battery to prevent injury or damage to the electrical system due to an accidental short circuit.**

**⚠ CAUTION**

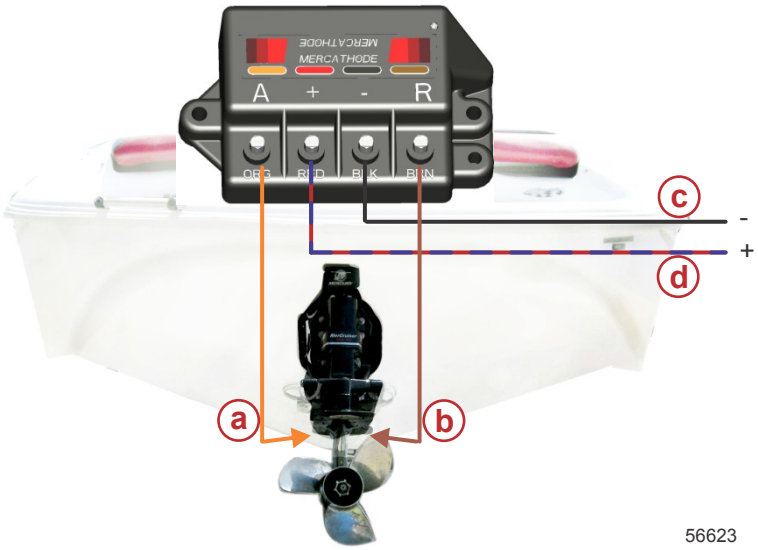
**Disconnecting or connecting the battery cables in the incorrect order can cause injury from electrical shock or can damage the electrical system. Always disconnect the negative (-) battery cable first and connect it last.**

**IMPORTANT: The MerCathode system positive (+) battery lead should be connected directly to the battery to ensure that the MerCathode system always remains energized in the event that the battery switch (if equipped) is turned off. If an engine harness ground connection is not available, the negative (–) wire from the MerCathode controller should be connected directly to the negative terminal of the battery. (The additional required wiring is not included in this kit.)**

1. Choose a mounting location for the MerCathode controller that will keep the unit away from water exposure. To prevent moisture accumulation, the controller must be mounted with the controller face up and flat, or vertically mounted with the wiring connections on the bottom.

| Typical Controller Mounting Locations | |
|---|---|
| MerCruiser V6 and V8 | On the circuit breaker box at the front of the engine or on the top of the throttle bracket |
| GM and Mercury Marine I/L4 | On the bracket above the starter solenoid |
| Optional | Moisture-protected and properly oriented location in the engine compartment |

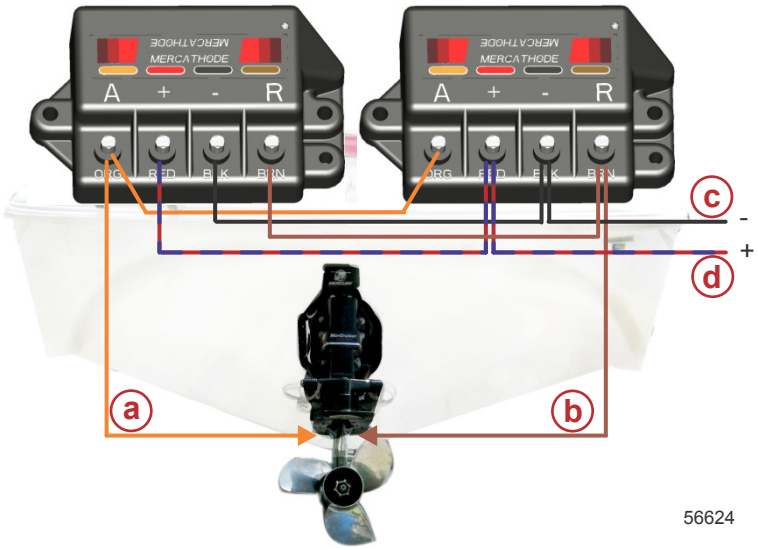
2. Secure the controller housing with the supplied hardware.
3. Install the wiring for the MerCathode controller assembly as indicated.




56623

**Single MerCathode application**

- **a -** Orange lead from the anode on the transom assembly
- **b -** Brown lead from the reference electrode on transom assembly
- **c -** Black lead from the engine harness or battery ground
- **d -** Red/purple lead connected to the positive (+) battery terminal




56624

**Dual MerCathode controller application**

- **a -** Orange lead from the anode on the transom assembly
- **b -** Brown lead from the reference electrode on transom assembly
- **c -** Black lead from the engine harness or battery ground
- **d -** Red/purple lead connected to the positive (+) battery terminal

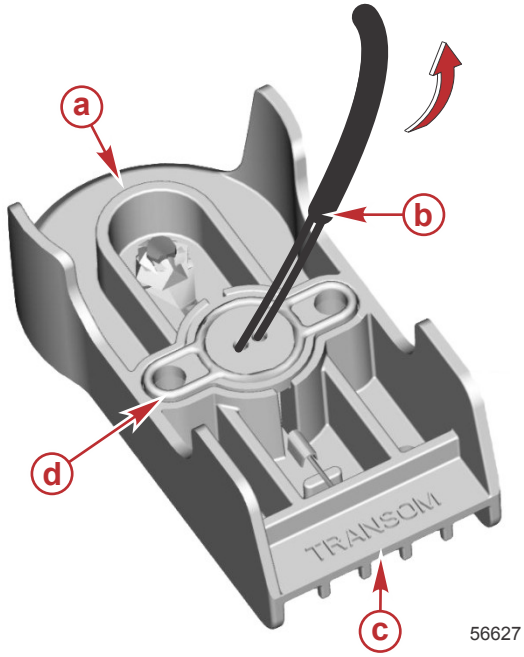
4. Apply Liquid Neoprene to all electrical connections to prevent corrosion.

| Tube Ref No. | Description | Where Used | Part No. |
|---|---|---|---|
| 25 | Liquid Neoprene | Electrical connections | 92- 25711 3 |

## Installing the Gimbal Mounted MerCathode Assembly

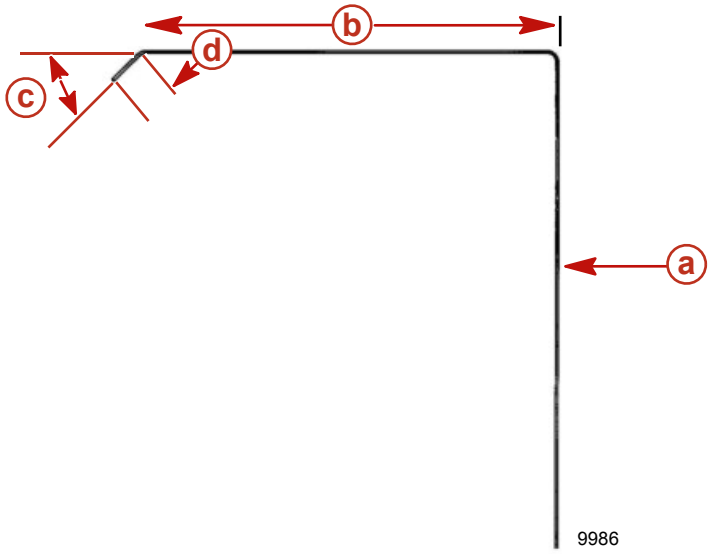
**IMPORTANT: The rubber seal must be properly seated in the groove of the anode assembly or water will leak into the boat.**

1. Ensure that the factory-installed rubber seal is firmly seated in the MerCathode anode assembly.




**a -** Anode assembly
**b -** Harness
**c -** Reference electrode
**d -** Rubber seal

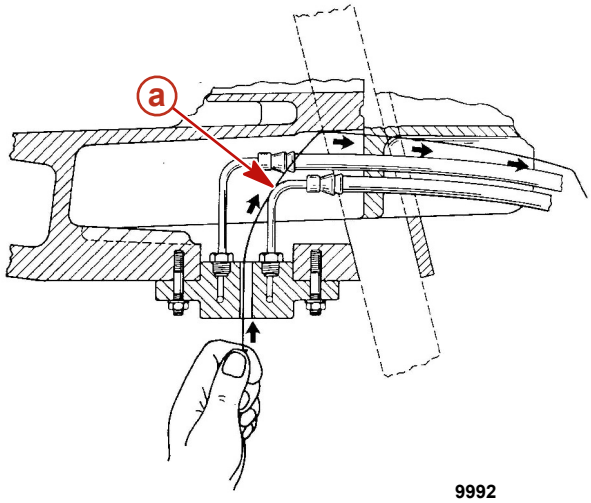
2. Form a 61 cm (2 ft) long piece of rigid wire to the following specified dimensions.




**a -** 47 cm (18.5 in.)
**b -** 12.5 cm (5 in.)
**c -** 45º angle
**d -** 13 mm (0.50 in.)

3. Insert the angled end of the guide wire through the center hole in the hydraulic connector block.

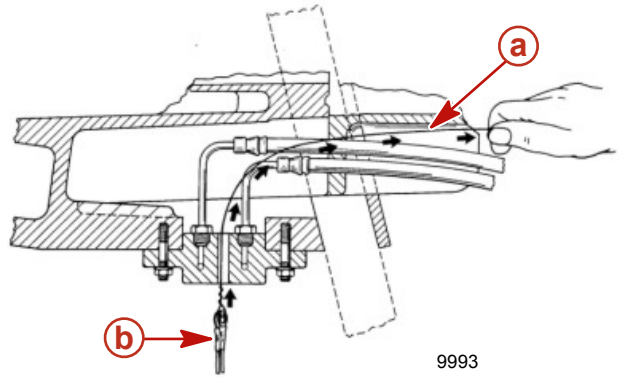
4. Guide the wire through the hole until the wire protrudes through the cavity at the bottom of the exhaust pipe.




9992

**a -** Formed guide wire

5. Secure the electrode wires to the formed guide wire with electrical tape.
6. Pull the electrode wires through the transom assembly and into the boat.



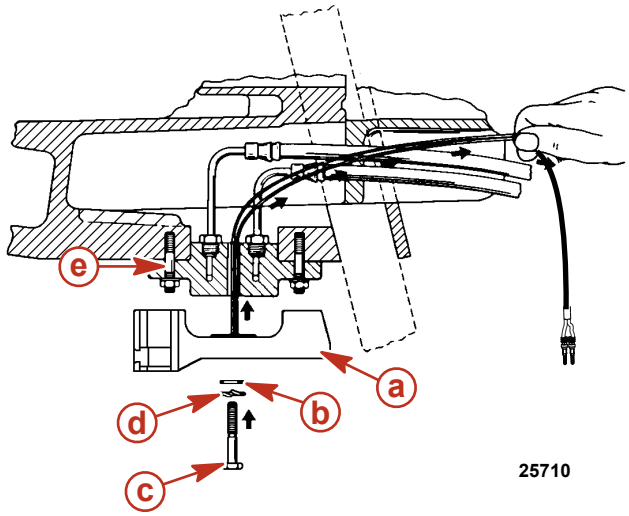

9993

**a -** Formed guide wire
**b -** Electrode wires

## *NOTICE*

**Coating or damaging sacrificial anodes and reference electrodes makes them ineffective at inhibiting galvanic corrosion. Do not paint these anodes or electrodes or clean them with steel wool, sandpaper, wire brushes, or other abrasive materials.**

7. Secure the anode assembly to the gimbal housing with two mounting screws. Use one washer and one lockwasher for each mounting screw.
8. Tighten the mounting screws to the specified torque.

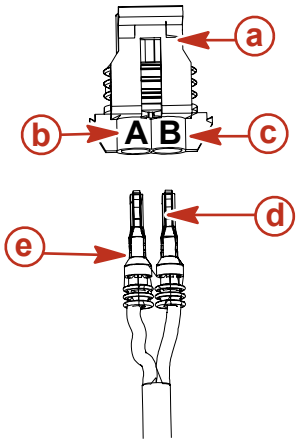


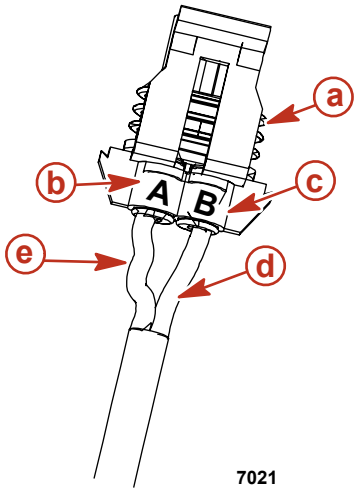

25710

**a -** Anode assembly
**b -** Lockwasher (2)
**c -** Mounting screw, 0.250-20 x 1.375 in. (2)
**d -** Washer (2)
**e -** Hydraulic connector block

| Description | Nm | lb-in. | lb-ft |
|---|---|---|---|
| Mounting screw, 0.250-20 x 1.375 in. | 2.8 | 25 | – |

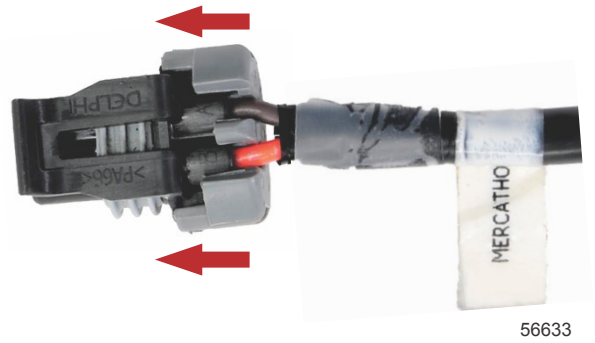
9. Insert the brown wire lead from the MerCathode assembly harness into connector terminal A by firmly pushing it into the back of the connector until completely seated.
10. Insert the orange wire lead from the MerCathode assembly harness into connector terminal B by firmly pushing it into the back of the connector until completely seated.



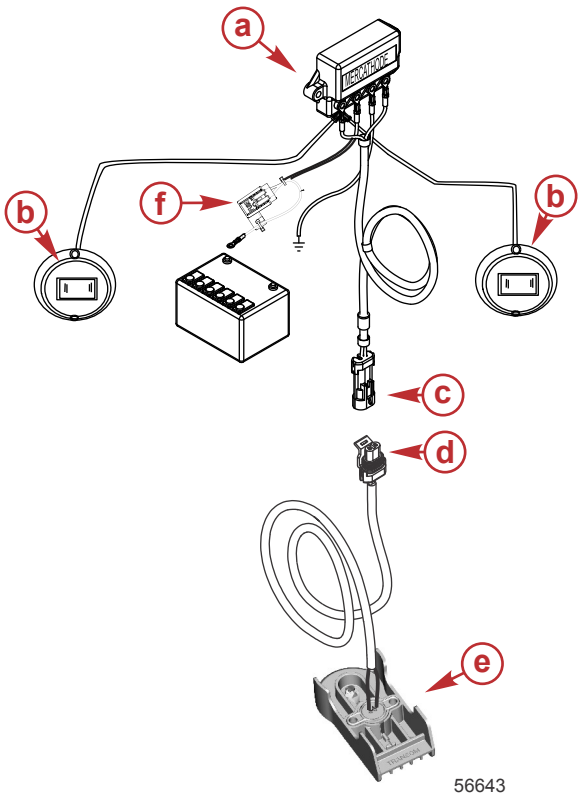

**a -** Connector
**b -** Connector terminal A
**c -** Connector terminal B
**d -** Orange wire lead
**e -** Brown wire lead

11. Install the connector cap.




**Connector with cap**

## MerCathode Wiring With Optional Transom-Mounted Anodes




- **a -** MerCathode controller
- **b -** Anodes
- **c -** Male connector
- **d -** Female connector
- **e -** Anode assembly
- **f -** 5-amp fuse

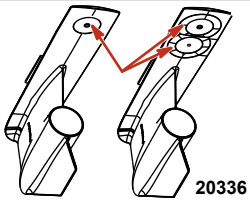
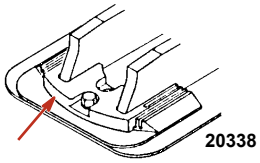
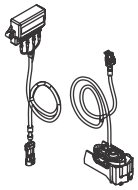
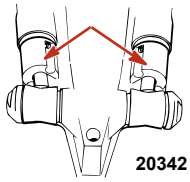
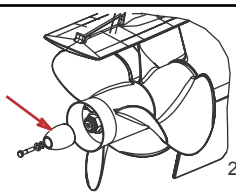
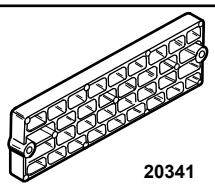
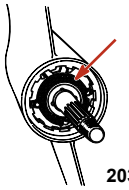
## Anodes and MerCathode System Locations

IMPORTANT:

- **Do not install any sacrificial anodes within 25.4 cm (10 in.) of the reference electrode located in the gimbal-mounted MerCathode assembly. Remove any previously installed sacrificial anodes located within 25.4 cm (10 in.) of the reference electrode located in the gimbal mounted MerCathode assembly.**
- **The two bottom transom mounting bolts may have anodic caps on some older models. These anodic caps must be removed and replaced with the plastic caps supplied with the MerCathode kit. Failure to remove these anodic caps will decrease the level of protection that is provided by the MerCathode system.**
- **Replace sacrificial anodes if eroded 50 percent or more.**

The following sacrificial anodes may be installed at different locations on your power package. Anodes help protect against galvanic corrosion by sacrificing their metal to the corrosion process thereby protecting the metal components on the power package.

The MerCathode system replaces the anode block on the bottom of the gimbal housing assembly. Test the MerCathode system for adequate output. Perform the test where the boat is moored. Refer to **Testing Procedure**.

| Anodes and MerCathode System Locations | | |
|---|---|---|
| **Description** | **Location** | **Figure** |
| Gearcase anode plate | Mounted on the underside of the lower gearcase. |  20336 |
| Ventilation plate anode | Mounted on the front of the gearcase. |  20338 |
| MerCathode System Controller | The MerCathode electrode is mounted to the underside of the gimbal housing. The MerCathode controller is mounted on the engine or on the boat transom. The controller harness connects to the electrode harness. |  20340 |
| Trim cylinder anodes | Mounted on each of the trim cylinders. |  20342 |
| Propeller shaft anode | Located behind the aft propeller. |  20344 |
| Anode kit (if equipped) | Mounted to the boat transom. |  20341 |
| Bearing carrier anode (Bravo One) | Located in front of the propeller, between the front side of the propeller and the gear housing. |  20343 |

# Testing Procedure

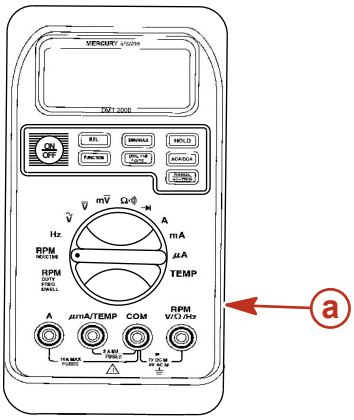
***NOTE:***

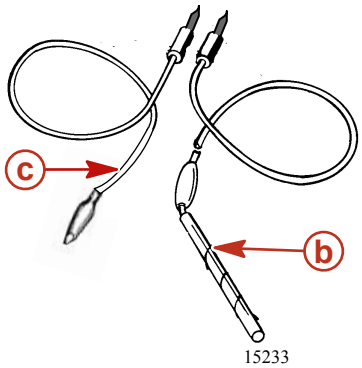
- *The following corrosion protection test supersedes all previously issued tests. This test can be used on applications with or without a MerCathode system.*
- *This test should be performed on all boats annually where the boat is moored to ensure that the system is functioning properly.*

The test requires the use of a Quicksilver reference electrode tester and a digital multimeter.

IMPORTANT:

- **A standard analog meter will give an inaccurate reading. Do not use an analog meter for the following test.**
- **The Quicksilver reference electrode tester is equipped with a special connector containing a resistor to provide the proper scale reading when used with a digital multimeter. Corrosion testing must be performed with a Quicksilver reference electrode tester (91-76675T1) and digital multimeter.**




**Digital multimeter and Quicksilver reference electrode tester**

**a -** DMT 2000A tachometer/ multimeter

**b -** Quicksilver reference electrode tester

**c -** Black meter lead

IMPORTANT:

- **Ensure that the battery is fully charged (12.6 volts or above).**
- **Boats recently placed in service usually will produce a reading higher than normal because the sterndrive unit is protected by a good finish and new sacrificial anodes. To obtain an accurate diagnosis, test after the boat has been in service at least one or two weeks.**
- **Boats should be moored without being operated for at least eight hours before performing tests. The mooring time allows the MerCathode system and the sacrificial anodes to polarize the surrounding water. Be careful not to rock the boat excessively while boarding to perform the test as this will alter the test reading.**

1. Set meter on the scale required to read 0–2000 millivolts.
2. Connect the negative meter lead to the negative (–) battery terminal or other convenient engine ground.
3. Connect the Quicksilver reference electrode tester lead into the positive (+) receptacle of the digital multimeter.
4. Immerse the Quicksilver reference electrode tester in the water within 15 cm (6 in.) of the sterndrive.

   **IMPORTANT: The type of MerCathode system you are testing and the specific operational environment of the boat will affect the voltage readings obtained by the testing procedure. The tables give a range of acceptable readings.**
5. The specifications listed on the following table indicate the corrosion protection status of the sterndrive unit. Refer to the Mercury **Marine Corrosion Protection Guide** for additional information.

| | Digital multimeter | Corrosion protection |
|---|---|---|
| **Freshwater** | 750–1050 millivolts | Sterndrive is protected |
| | Below 750 millivolts | Sterndrive is corroding |
| | Above 1050 millivolts | Sterndrive is overprotected |

| | Digital multimeter | Corrosion protection |
|---|---|---|
| **Salt, Polluted, or Mineral Laden-Water** | 850–1100 millivolts | Sterndrive is protected |
| | Below 850 millivolts | Sterndrive is corroding |
| | Above 1100 millivolts | Sterndrive is overprotected |

***NOTICE***

**Washing the MerCathode assembly can damage components and lead to rapid corrosion. Do not use any cleaning equipment such as brushes or high-pressure washers to clean the MerCathode assembly.**

# Theory of Operation

The MerCathode system provides automatic protection against galvanic corrosion. A solid-state device that operates off a vessel's battery, the MerCathode system provides protection by impressing a reverse blocking current that stops the destructive flow of galvanic currents. The black MerCathode controller will regulate output to maintain 0.94 volts at the reference electrode.

A solid green LED indicates that the system is operating correctly. A flashing LED indicates that a fault has occurred, or that an abnormal condition exists.

**IMPORTANT: When a boat or new drive is first put into service the LED may initially indicate that the protective current is not being supplied through the MerCathode anode. This condition is normal, yet the LED may flash for a period of time. The green LED will become steady after the boat is moored for a period of eight hours without operation.**

## Fault Codes

| Fault Codes | |
|---|---|
| **LED** | **Fault** |
| Solid green light | No fault - controller working properly. Reference voltage is between 0.86 and 1.04 VDC. |
| 2 flashes per second | Shorted/open reference electrode/anode, high controller temperature, or reference voltage exceeds 1.4 VDC. |
| 1 flash per 4 seconds | Reference voltage is outside of the normal expected range (below 0.86 or above 1.04 VDC). System is stabilizing. Monitor for further change. |
| Green light not on | Boat out of water, or in a dry dock condition. Both anode and reference electrode circuits are open. No power to the controller. |

# Vessels Equipped with AC Shore Power

| *NOTICE* |
|---|
| **Connecting to AC shore power significantly increases the potential for galvanic corrosion. Isolate shore power from the boat ground to prevent corrosion.** |

Vessels connected to AC shore power require additional anti-corrosion protection. The shore power connection can allow low-voltage currents to pass through the AC shore power ground circuit, greatly increasing the potential for destructive galvanic corrosion. Installation of a Quicksilver Galvanic Isolator will block low voltage galvanic currents on the shore power ground circuit.

**Products of Mercury Marine**
W6250 Pioneer Road
Fond du Lac, WI 54936-1939