

Warranty,  
Technical Support, and  
Trouble Shooting Guide



# Contents

## Part I: Warranty Guide

Warranty: Transferable Limited Lifetime (IS0090)	Page 2
Warranty: Marine OEM, Dealer Direct (IS0073)	Page 3
Marine Instrumentation Facts (IS0060)	Page 5

## Part II: Technical Guide

Technical Specifications	Page 9
Tachometers	Page 11
Operation	Page 11
Application	Page 11
Calibration	Page 11
Troubleshooting	Page 12
Synchronizers	
Operation	Page 13
Calibration	Page 13
Troubleshooting	Page 13
Speedometers - Mechanical	
Operation	Page 14
Troubleshooting	Page 14
Speedometers - Electronic	
Operation	Page 15
Calibration	Page 15
Troubleshooting	Page 15
Miscellaneous Gauges - (Fuel, Oil Pressure, Water Temp., Rudder Angle, Trim)	
Operation	Page 17
Troubleshooting	Page 17
Voltmeters	
Operation	Page 19
Troubleshooting	Page 19
Ammeters	
Operation	Page 20
Troubleshooting	Page 20

## Appendices:

Appendix I	Instrument Dimensional Drawings (Basic Styles)
Appendix II	Faria Instrument Tester Instructions (IS0087)
Appendix III	ABYC - Engine and Accessory Wiring Color Code Guide
Appendix IV	Choosing the Proper Sender
Appendix V	Outboard Tachometer Application Table (IS0086)
Appendix VI	Sending Unit Resistance Values Table (IS0085)
Appendix VII	Troubleshooting Quick Reference Guide

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**January 1, 2014**

Dear Valued Customer,

As one of the marine industry's leading suppliers of after-market and original equipment gauges, we at Faria® Corporation realize that building some of the worlds finest products is in itself not enough. Our service must match our quality. In keeping with this commitment, we are happy to bring you our Warranty, Technical Service and Troubleshooting Manual.

We are certain that instrument users of all levels, from builder to boaters, will find this a useful tool in solving instrumentation related problems, making the sport more enjoyable for all. For more information about the installation of and instructions on how to use our gauges we invite you to check out our website at [www.faria-instruments.com/downloads.php](http://www.faria-instruments.com/downloads.php). Here you will find copies, ready to download, of our most current instructions sheets and owner's manuals for your use.

Happy Boating!

Jason Clark  
Manager, Customer Services

P.O. Box 983,  
Uncasville, CT USA 06382-0983  
Tel: 860-848-9271  
Fax: 860-848-2704  
Customer Service: 800-473-2742  
e-mail: [faria@faria-instruments.com](mailto:faria@faria-instruments.com)

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# Part 1

# Warranty Guide



## Faria Limited Warranty

During the initial warranty period of 36 months from date of original retail purchase (12 months on fog resistant lens, Fuel Manager, Depth Sounder, Commander-Speedo, Commander-Tach, Pilot I, Pilot II, MG1000, MG2000 and MG3000 and 24 months on Senders, Transducers, Triducers and Smartducers), any instrument(s) that fails due to defects in materials or workmanship will be repaired or replaced at Faria Marine Instruments' option at no charge.

Once beyond the initial warranty period the repair fees listed apply. Upon completion of repair or replacement the applicable initial warranty period of 36/12 months is then renewed.

To submit a Warranty Claim or Repair, go to our repair website; **warranty.faria-instruments.com**, and complete the form. You will be given an authorization number to return the instrument, postage prepaid and packaged to prevent damage while in transit, include your name, address, daytime telephone number, sales receipt, and a brief description of the problem. For all non warranty repairs a shipping and handling fee of \$18.50 will be applied to the repair for standard shipments.

Your part(s) will be promptly returned to you once analyzed, repaired or replaced. Instrument styles which are no longer manufactured, may be replaced with a similar instrument of equal or greater value.

If you have questions call **Faria Customer Service at 1-800-473-2742** weekdays 8:30 a.m. until 5:00 p.m. Eastern Time. One of our Marine Applications Specialists will review the problem with you in detail.

Removal / reinstallation expenses, any damage to an instrument resulting from natural disasters, misuse, neglect, accident, misapplication, improper installation, unauthorized repair or alteration, and instruments purchased prior to March 1, 1985 are not covered by this warranty. Instruments returned to Faria® Marine Instruments that are not covered under this warranty will be repaired or replaced at our nominal service rates or returned to you as is, at your option. Faria® Marine Instruments expressly disclaims any liability for incidental or consequential damage caused by product defects. Some states do not allow the exclusion or limitation of consequential damages, so the above may not apply to you. The Warranty herein is in lieu of any other expressed warranty of merchantability or fitness or any other obligation on the part of Faria® Marine Instruments, the Thomas G. Faria Corporation, or the seller. All implied warranties are limited to the initial 36 month period. Some states do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you. This warranty gives you specific legal rights, and you also have other rights which vary from state to state.

\*These fees are in effect as of 5/01/2013 and are subject to change without notice.

### \*Repair Fees

for gauges beyond the initial warranty period

2 inch instruments (not specified)	\$55.00
2 inch Clock or Hourmeter	\$75.00
2 inch Warning System Indicator	\$75.00
2 inch Honda Trim	\$75.00
Digital Depth Sounder	\$100.00
Fuel Flow Manager	\$100.00
Standard Speedometer or Water Pressure gauge	\$55.00
Electronic Speedometer w/sensor	\$100.00
Standard Tachometer, Synchronizer or Electronic Speedometer	\$100.00
Standard Tachometer with Hourmeter or System Indicator	\$125.00
Multifunction Instruments	\$125.00
<b>MG electronic instruments</b>	
Speedometer or Tachometer	\$225.00
Senders and Transducers	\$65.00
Triducers and Smartducers	\$225.00



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Tel: 860-848-9271 Fax: 860-848-2704  
[www.faria-instruments.com](http://www.faria-instruments.com)





## Dealer Direct Warranty

### Supplement to the *Transferable Limited Lifetime Warranty*

During the first 24 months from the date of original retail purchase (12 months on PWC, fog resistant lens, Fuel Managers, Depth Sounders, Commander-Speedo, Commander-Tach, Pilot I, Pilot II and MG2000), Faria® Marine Instruments will provide an advance replacement at no charge, shipped within 24 hours freight prepaid and will pay \$13.50 labor/freight reimbursement to qualified dealers for replacement of any Faria® Marine instruments purchased after May 31, 1994, returned to Faria®, and found to be defective due to materials or workmanship.

To submit a Dealer-Direct Warranty claim, call Faria® Customer Service at 1-800-473-2742. One of our marine application specialists will review the problem with you in detail. If no solution is found, a replacement will be shipped at no charge directly to you the next business day via priority mail, freight prepaid. Any requests for premium freight via UPS Red or Blue, FedEx Overnight etc. will carry a \$10.00 handling fee in addition to the premium freight charges. Same day shipping is not available.

Upon receipt, simply return the original instrument in the same box along with the completed warranty tag, postage prepaid to:

Faria® Marine Instruments  
WARRANTY SERVICE, P.O. Box 983,  
385 Norwich-New London Turnpike  
Uncasville, CT 06382-0983.

You will be paid \$13.50 labor/freight reimbursement for each Faria® Marine Instrument returned and found to be defective. No instruments will be returned to Dealers.



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# Instrument Facts

*Your Boat has been outfitted with instruments manufactured by Faria® Marine Instruments. Each instrument has been manufactured in an ISO:9001 2008 registered facility, built to stringent standards and has passed a comprehensive quality control procedure prior to shipment. Each instrument is backed by a limited lifetime warranty.*

## **The Instrument System:**

Your Instrument System consists of individual gauges, wiring harnesses, senders, sensors and transducers. Each of these items has their own tolerances. If these tolerances “stack up” in opposite directions it can lead to what may be perceived as a larger difference in operating readings than actually exists. As long as the readings are within the engine’s specified operating band, the engines are operating properly.

## **Tachometers:**

Most Tachometers have a tolerance of  $\pm 2\%$  of full scale ( $\pm 120$  rpm on a 6000-rpm tach). Tachometers will zero when the key is turned on; it doesn’t matter what the tach reads with the key off.

## **Speedometers:**

Paddlewheel driven tournament speedometers are manufactured with a fluid filled pointer bobbin. This fluid aids in the control of bounce and reduces rapid movements of the pointer. Due to the viscosity of this fluid, it is important that the instrument not be placed glass side down on a surface for longer than a few seconds. This face down position may cause leakage of the speedometer bobbin fluid, which can then render the instrument unusable and/or irreparable.

## **Pilot 1/Tach-Hourmeter:**

To ensure accuracy, the Pilot 1 Speedometer and all Faria Tach-Hourmeter Combination Instruments utilize Engine Running Only hourmeters. This instrument does not read engine hours until a certain voltage has been achieved during engine use.

## **Fuel gauges:**

Fuel gauges may at some times seem to “bounce”. In most circumstances this is actually caused by the fuel sloshing in the tank and does not necessarily indicate a problem with the gauge or sender.

## **Instrument Fogging with Standard Glass Lens:**

Most marine instruments have small vents in their cases to allow a way out for moisture that finds its way in. It is possible for moist air to be drawn into the vents when the air inside the gauge cools down after the instrument is turned off. The morning sun can draw this moisture up against the lens, causing fogging. Turning on the instrument with the instrument light “on” will speed up moisture removal. Fogging is not abnormal, nor will it harm your instrument, which is built to withstand the harsh marine environment.

## **Instruments with Fog Resistant Lenses:**

These instruments are manufactured with a polycarbonate or glass lens which utilize an anti-fog coating. This coating eliminates fogging in the instrument.

## **Radio Transmissions:**

Some interference (erratic operation) may be noticed on tachometers or synchronizers during radio transmissions. This will neither damage the instrument nor affect its accuracy when not transmitting.

## **Pointer Jumping (mostly for older instruments):**

Occasionally when an engine has been revved up high and then abruptly shut off, the pointer will fall to the incorrect starting pin on the instrument. (For example, on a 6000 Rpm Tachometer – The pointer sits on the numeral six instead of beginning at zero.) There is a quick on-site fix to this problem. Place a magnet against the glass directly on the end of the pointer resting on the increments. You can slowly move the magnet and drag the pointer back to the zero position.



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# Part 2

# Technical Guide

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# Specifications

## of Faria Marine Instruments



### 4" & 5" Electronic Instruments

Operating Temperature	-4 °F to +158 ° F (-20 °C to +70 °C)
Storage Temperature	-22 °F to +185 ° F (-30 °C to +85 °C)
Lighting	See product line for specific information
Operating Voltage	11.5 to 16 volts
Nominal Voltage	14.2 volts
Current Consumption	< 100 mA, without illumination
Bezel	Stainless Steel or Aluminum - see product line for specific information
Lens	Glass or Polycarbonate - see product line for specific information
Connection	Studs, blade terminals, connectors - see product line for specific information
Mounting Bracket	Plastic mounting clamp. Clamping range 0 -.8" (0-20 mm)
Torque	5 to 7 inch pounds (.57 - .80 Nm)
Mounting Hole	3 3/8" (85 mm) for 4" Instrument - 4 3/8" (112 mm) for 5" Instrument

### 4" & 5" Mechanical Instruments

Operating Temperature	-22 °F to +185 ° F (-30 °C to +85 °C)
Storage Temperature	-40 °F to +221 ° F (-40 °C to +105 °C)
Lighting	See product line for specific information
Bezel	Stainless Steel or Aluminum - see product line for specific information
Lens	Glass or Polycarbonate - see product line for specific information
Connection	Studs, blade terminals - see product line for specific information
Mounting Bracket	Plastic mounting clamp. Clamping range 0 -.8" (0-20 mm)
Torque	5 to 7 inch pounds (.57 - .80 Nm)
Mounting Hole	3 3/8" (85 mm) for 4" Instrument - 4 3/8" (112 mm) for 5" Instrument

### 2" Electronic Instruments

Operating Temperature	-4 °F to +158 ° F (-20 °C to +70 °C)
Storage Temperature	-22 °F to +185 ° F (-30 °C to +85 °C)
Lighting	See product line for specific information
Operating Voltage	11.5 to 16 volts
Nominal Voltage	14.2 volts
Current Consumption	< 100 mA, without illumination
Bezel	Stainless Steel or Aluminum - see product line for specific information
Lens	Glass or Polycarbonate - see product line for specific information
Connection	Studs, blade terminals, connectors - see product line for specific information
Mounting Bracket	Plastic mounting clamp. Clamping range 0 -.8" (0-20 mm)
Torque	5 to 7 inch pounds (.57 - .80 Nm)
Mounting Hole	2 1/16" (53 mm) for 2" Instrument

### 2" Mechanical Instruments

Operating Temperature	-22 °F to +185 ° F (-30 °C to +85 °C)
Storage Temperature	-40 °F to +221 ° F (-40 °C to +105 °C)
Lighting	See product line for specific information
Bezel	Stainless Steel or Aluminum - see product line for specific information
Lens	Glass or Polycarbonate - see product line for specific information
Connection	Studs, blade terminals - see product line for specific information
Mounting Bracket	Plastic clamp, metal on water pressure. Clamping range 0 -.8" (0-20 mm)
Torque	5 to 7 inch pounds (.57 - .80 Nm)
Mounting Hole	2 1/16" (53 mm) for 2" Instrument

#### The Instrument System:

Your Instrument System consists of individual gauges, wiring harnesses, senders, sensors and transducers. Each of these items has their own tolerances. If these tolerances "stack up" in opposite directions it can lead to what may be perceived as a larger difference in operating readings than actually exists. In twin engine applications it's not unusual for tachs and gauges to have slightly different readings between engines. As long as the readings are within the engine's specified operating band, the engines are operating properly.

#### Tachometers:

Most Tachometers have a tolerance of  $\pm 2\%$  of full scale ( $\pm 120$  rpm on a 6000-rpm tach). In twin engine applications this could mean that there is a 240 rpm difference between tach readings when the engines are in synch. Tachometers will zero when the key is turned on; it doesn't matter what the tach reads with the key off.

#### Synchronizer:

The Synchronizer is designed to provide an extremely accurate indication of when the Rpm's of both engines are the same – or when they are "synchronized". There are many reasons why it is desirable to operate dual engines "in synchronization" ranging from improved efficiency and reduced vibration to greater passenger comfort. Like a tachometer, the Synchronizer counts "pulses" from the ignition or tach signal source of each engine, compares them to each other and displays any difference as a pointer swing toward the engine running slower. When both engines are running at the same RPM, the pointer will be in the mid "synchronized" position. If one engine is running slower than the other is, the pointer will swing towards the engine. Adjusting the RPMs of either engine can then synchronize the engines.

#### Trim gauges:

All trim gauges are calibrated to be the most accurate and useful in the engine down or "trim" range. The gauge may not read full "up" in some cases. This is not unusual nor does it indicate a problem with either the trim sender or the gauge.

#### Fuel gauges:

Fuel gauges may at some times seem to "bounce". In most circumstances this is actually caused by the fuel sloshing in the tank and does not necessarily indicate a problem with the gauge or sender.

#### Instrument Fogging:

All of your Instruments are not fog resistant – BUT - they do have small vents in their cases to allow a way out for moisture that finds its way in. Occasionally moist air maybe drawn into the vents when the air inside the gauge cools down after the instrument is turned off.

The morning sun can draw this moisture up against the lens, causing fogging. Turning on the instrument with the instrument light "on" will speed up moisture removal. Fogging will not harm your instrument, which is built to withstand the harsh marine environment.

#### Radio Transmissions:

Some interference (erratic operation) may be noticed on tachometers or synchronizers during radio transmissions. This will neither damage the instrument nor affect its accuracy when not transmitting.

All Faria Marine Instruments comes with a Limited Lifetime Warranty see [www.faria-instruments.com](http://www.faria-instruments.com) for details.



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# Tachometers

## Operation

Electronic tachometers work by counting pulses generated by the ignition system, alternator, tachometer signal generator, or magnetic pickup sender. The tachometer is hooked up to +12 VDC, Ground, and one of the signal sources listed above. By selecting the right tachometer and setting the switch on the back to the correct position, you let the tachometer know how many pulses are sent per each engine revolution. From this information, the tachometer displays the correct engine speed. See Appendix I for tachometer dimensions. Instrument part numbers are located on a label attached to the outside of the case (i.e. TC000A).

## Application

4 cycle engines: The tachometer signal terminal is connected to the negative terminal on the ignition coil or to a transistorized tachometer driver circuit connected to the ignition system. This circuit will have a wire (usually gray) for connection to the tachometer. The correct tachometer will have a white label on the side indicating which switch position is for each engine type. This label will include 4, 6, and 8 cylinder engines for positions 1, 2 and 3.

Outboard engines: The tachometer signal terminal is usually contacted to the unrectified AC output of the alternator/lighting coil. Sometimes it is hooked directly to the stator output wire (usually yellow) other times a gray tachometer output lead is provided. The correct tachometer for this application will have a white label on the side with switch positions 4, 6, 8, 10 or 12 pole alternators. The number of poles on the alternator can be determined by checking the Faria® Outboard Tachometer Application table. (See Appendix V)

Diesel engines: The tachometer signal terminal is hooked up to 1 of 3 things: a) the alternator, b) a tach signal generator that is spun by the mechanical take-off, or c) a magnetic pickup sensor which counts gear teeth.

a) The alternator tachometer: which is also called a variable ratio tachometer is hooked up to the AC output terminal on the alternator. This terminal can be tracked in a variety of different ways: AC, AUX., S, R, TACH or nothing at all. Once installed, the tachometer is then calibrated to that specific engine by using a shop tachometer or a known “no load” governor speed. The white label on this tach gives the formula: [Crankshaft pulley diameter divided by the alternator pulley diameter times the number of Alternator Poles = N]. “N” is used to determine the correct switch setting. Another adjustment on the back allows for fine tuning.

b) The Switching Diesel Tachometer: is hooked up to a tachometer signal generator which is spun by the engines’ mechanical take-off. One of the signal generator’s wires is grounded to the engine and the other is connected to the tachometer’s signal terminal. The white label on this tach is marked: 1/2:1, 1:1, 1.5:1, 2:1, which corresponds to the different mechanical take-off ratios.

c) The Mag Pickup Tachometer: hooks up to a magnetic pickup sensor which counts gear teeth. Here neither of the wires is grounded to the block. They are both routed up to the tachometer as a twisted pair. One hooks to the signal terminal and the other to the ground terminal on back of the tachometer. The switch is set to the approximate number of teeth that the sensor sees on each engine revolution. Another adjustment on the back allows fine tuning to the exact number of teeth. The label is marked in ranges generally from 30 to 160 gear teeth.

## Calibration

Set up a calibrated “shop tachometer” or “strobe tachometer” to monitor the engine’s true RPM. Start the engine and (after an appropriate warm-up period and with the shift in neutral) increase the engine speed to the boat’s normal cruising RPM read on the shop tachometer. Set the coarse adjustment switch to the proper position described on the label. Remove the stop-plug or paper label corner (at the 8 o’clock position on the rear of the case for most) and insert 5/64” Allen wrench into the “Fine adjustment” trim pot, rotating it CW or CCW as necessary to indicate the true RPM.

## Troubleshooting

Symptom recognition is the first step in effective instrumentation troubleshooting. Tachometers usually exhibit the following symptoms: a) dead, b) pegged, c) erratic, d) reading high, e) reading low, and f) sticky. More thorough tests of all tachometers can be conducted using the *Faria® Instrumentation Tester*. (See Appendix III).

### ***Symptom:***

A. Dead - This is usually caused by: a) No power applied, b) No signal supplied, or c) Tachometer is damaged by electrical transients caused by disconnecting the battery with the engine running.

1. Check to see if power is applied to tachometer by switching the instrument power supply switch on and off. As power is applied, the pointer should jump slightly. If it does not, check to see that the wires are installed on the correct terminals and that 12 volts are actually applied to the terminals themselves.

2. If tachometer indicates that power is applied, check for the presence of a signal on the signal terminal. Measure the signal between the signal and ground terminals. This should read in excess of 2 volts DC.

3. If power and signal are present, then it is possible that the tachometer has been damaged by electrical transients.

B. Pegged - This condition occurs on tachometers with internal mechanical pointer stops. It is caused by removing power from the tachometer while it is running in excess of mid-scale RPMs or by the switch on back of the tachometer being in between positions. When power is reapplied, the tachometer pointer attempts to go clockwise to zero but can not because the internal stop is in the way.

C. Erratic - This symptom is caused mostly by an intermittent connection between the wire and the ring or spade connector. Often the wire's insulation is pushed into the crimp area and crimped. The center conductor casually touches the connector allowing the tachometer to work most of the time but causing a nightmare for the technician. Electrical noise also can cause erratic readings. See "Reading High" for further information.

D. Reading High — This is usually caused by the switch on the back of the tachometer being in the wrong position. If the number of cylinders or alternator poles selected by the switch is too low, the tachometer will read high. If a variable alternator or mag pick-up tachometer is being used, then further calibration may be necessary, as this calibration is done by the end user. See 'Calibration'. Excessive electrical noise may also cause the tachometer to read high. These noise spikes are counted by the tachometer as engine RPM's. The wire affected by the noise can be identified by connecting one wire at a time to the tachometer directly from the battery or the signal source on the engine.

E. Reading Low - If the number of cylinders or altimeter poles selected by the switch is too high, then the tachometer will read low. If a variable ratio or mag pick-up tachometer is being used, further calibration by the end user maybe necessary. See 'Calibration.'

F. Sticky - If the tachometer appears to "stick" during operation, slightly loosen the nuts holding back clamp and check operation. If the tachometer now operates properly and is not loose in panel, the tachometer now should provide suitable service. If the tachometer continues to stick during operation - replace the tachometer.

# Synchronizers

## Operation

Electronic synchronizers work by comparing the pulse frequencies generated by the ignition systems, alternators, tachometer signal generators, or magnetic pickup senders of dual engine installations. The synchronizer is hooked up to +12 VDC, Ground, and to each tachometer's signal source. By selecting the right synchronizer (magnetic pickup that use synchronizers that function only in that application) and setting the switch on the back to the correct position, you let the synchronizer compare the frequency of pulses sent per each engine's revolution. From this information, the synchronizer displays a variance in engine speed by swinging its pointer toward the slower engine. See Appendix I for synchronizer dimensions. Instrument part numbers are located on a label attached to the outside of the case (i.e. SY0000A).

## Calibration

Start the engines and (after an appropriate warm-up period and with shifts in neutral) increase the engine speeds to the boat's normal cruising RPM. (Both tachometers must be properly calibrated). Set the coarse adjustment switch to the proper position described on the label on the side of the case. Remove the stop-plug (at the 8 o'clock position on the rear of the case for most) and insert a 5/16" Allen wrench into the "fine adjustment" trim pot, rotating it CW or CCW as necessary to center the synchronizer.

## Trouble shooting

Symptom:

A. Dead - This is usually caused by: a) No power applied, b) No signal supplied, c) Sync damaged by electrical transients caused by disconnecting the battery with the engine running.

1. Check to see if power is applied to synchronizer by switching the instrument power supply switch on and off. As power is applied, the pointer should jump slightly. If it does not, check to see that the wires are installed on the correct terminals and that 12 volts are actually applied to the terminals themselves.
2. If the synchronizer indicates that power is applied, check for the presence of a signal on the signal terminals. Measure the signal between the signal and ground terminals. This should read in excess of 2 volts DC.
3. If power and signals are present, then it is possible that the synchronizer has been damaged by electrical transients. See the enclosed technical bulletin for details. Replace the synchronizer.

B. Pegged (reading high/reading low) - This condition occurs when the synchronizer is in the wrong switch position or is not calibrated. Another adjustment on the rear of the synchronizer allows for fine tuning. See 'Calibration'.

C. Erratic - This symptom is caused mostly by an intermittent connection between the wire and the ring or spade connector. Often the wires insulation is pushed into the crimp area and crimped. The center conductor casually touches the connector allowing the sync to work most of the time but causing a nightmare for the technician. Electrical noise can also cause erratic readings. These noise spikes are counted by the sync as engine RPM's. The wire affected by the noise can be identified by connecting one wire at a time to the synchronizer directly from the battery or signal source on the engine.

D. Sticky — If the synchronizer appears to "stick" during operation, slightly loosen nuts holding backclamp and check operation. If sync now operates properly and is not loose in panel, the synchronizer now should provide suitable service. If the synchronizer continues to stick during operation -- replace synchronizer.

# *Mechanical Speedometer*

## **Operation**

Pitot tube type speedometers operate by pressure from the water being forced into the pitot tube. This pressure is then transmitted through flexible tubing to the bourdon tube movement inside the speedometer head where it is converted into a speed reading by the movement mechanism. See Appendix I for speedometer dimensions. Instrument part numbers are located on a label attached to the outside of the case (i.e. SE0000A).

## **Troubleshooting**

Symptom:

Speedometer does not register or sticks during operation - Slightly loosen the nut(s) holding back clamp and check operation. If the speedometer now operates properly and is not loose in panel, it should now provide suitable service.

If the speedometer continues to stick, follow the tubing from the speedometer head to the pitot tube water pickup, checking for any sharp bends or kinks that may be impeding the air flow to or from the speedometer unit. Also check for blockage at the pitot tube inlet hole.

NOTE: Compressed air at *NOT MORE THAN 20 PSI* may be used to check speedometer movement for free operation. This is equivalent to approximately 40 MPH. Due to variation in air gauges, etc., This is not a valid test for accuracy.

If tubing is free of obstructions, water pickup is not restricted, and unit continues to stick in operation, replace the speedometer.

If unit is not registering at all, check for breaks in the tubing and loosened connections at the pitot tube and the back of the speedometer. If loose connections are apparent, remove tubing from the pitot tube or speedometer head respectively, cut back the tubing approximately 1/2 inch with a sharp knife and reattach. No adhesive is recommended due to the fact that it may be introduced into the speedometer movement and cause a malfunction. If speedometer still does not register, replace the speedometer.

# *Electronic Speedometer*

## Operation

Electronic speedometers operate by capturing pulses produced by a paddle wheel rotating in the water stream under the hull. The pulses are then electronically converted to a speed-reading very much like a tachometer converts ignition pulses to RPM. Instruments part numbers and labeling are similar to a mechanical speedometer.

## Calibration

**For best results calibration should be performed in calm water with no current or tidal flow present.** You will need to time your boat's run over a known distance (such as a measured mile) to calculate MPH, or compare your speed to a GPS, Loran, or Radar gun. Speed runs should be done on plane, at cruise speed, at a constant RPM, and repeated several times to obtain an accurate average speed to which the speedometer will be adjusted. After you are satisfied you are maintaining a known constant speed through your runs, proceed as follows.

- 1) A Coarse adjustments may be necessary due to variations in hull shape and mounting limitations. The coarse adjustment is made by turning the six-position selector switch at the rear of the case. Start with the switch in position 3 or 4. Increase the setting if the speedometer reads high or decrease the setting if the speedometer reads low.
2. For Fine adjustments remove the weather seal plug on the rear of the speedometer located in the hole marked "ADJ".
3. With the boat at the known speed, carefully vary the adjustment pot (through the hole in the case) with the tool provided (5/64" Allen wrench) until your Faria Marine Instruments speedometer is in agreement with the boat's known speed. Turning the pot clockwise raises readings, counter clockwise lowers readings.

**Note:** For speedometers with the externally adjustable option, the knob on the dash takes the place of the internal Fine adjustment pot.

## Troubleshooting

Troubleshooting electronic speedometers can be accomplished in much the same way as troubleshooting a tachometer. Refer to page 12 for general symptoms.

First be sure that the Speed Sensor is properly installed.

The sensor is to be mounted so that it is parallel to the water flow at the boat's transom with the small "lip" of the adjustable paddle wheel support hooked against the transom's bottom.

**Note:** It may be necessary to tilt the paddle wheel deeper than parallel to increase high-speed sensitivity. The sensor is adjustable for transoms with zero to 16 degrees aft rake. It is important that the sensor be mounted on the "up wash" side of the prop. This is the Port side for a clockwise rotation and Starboard side for a counter-clockwise rotation as viewed from aft. Ideally the sensor should be located 2 to 4 inches outside the swing of the prop and away from any strakes or bottom features that may disturb the smooth flow of water to the paddle wheel.

## Testing the Speed Sensor output.

Calibration: 152 HZ = 35 MPH (4.34 HZ / MPH)

Sensor wiring color codes: **Black:** Signal, **Blue:** Positive 12 VDC, **Clear:** Ground

### Test the sensor on the boat connected to the speedometer:

**Note:** You may not be able to spin the paddle wheel with the boat in the water.

1. Turn the key to the ON position to supply power to the instrument.
2. With the paddle wheel still.

Check the VDC Signal to Ground at the back of the speedometer, it should be a bit less than battery voltage. (For example, with a battery voltage of 13 VDC at the rear of the speedometer, Signal to Ground voltage would be about 10 VDC). If the Signal to Ground reading is (Zero VDC) turn the paddle wheel slowly until you get a (10 VDC) reading on the voltmeter. If you slowly turn the paddle wheel and get these alternating voltage readings the sensor is good. If you slowly turn the paddle wheel and the voltage stays the same (10 VDC or Zero VDC), the sensor is bad.

3. Spin the paddle wheel. If the sensor is **good**: You will read about one half the Signal to Ground VDC or about (5 VDC) with sensor spinning.
4. Spin the paddle wheel. If the sensor is **bad**: You will read the original Signal to Ground voltage, (10 VDC or Zero VDC) with sensor spinning.

# Gauges - Miscellaneous

## Operation

Gauges operate by sending a low amperage current through the gauge's meter to ground via a sending unit with variable resistance. The resistance of the sending units increase or decrease with the changes in pressure, temperature, tilt, etc. As the sender's resistance varies, the amount of current allowed to flow through it to ground changes and the meter deflects. See Appendix I for gauge dimensions. Instrument part numbers are located on a label attached to the outside of the case (i.e. GP0000A).

## Troubleshooting

See Appendix VII for a quick reference troubleshooting guide.

Symptom:

A. Gauge appears to "stick" during operation: - Slightly loosen nuts holding hack clamp and check operation. If gauge now operates properly and is not loose in panel, gauge now should provide suitable service. If gauge continues to stick during operation -- replace gauge.

B. Gauge is inoperative:

1) To test for voltage to the gauge (use a 12 volt test light or voltmeter for testing):

a) Turn key switch to the ON position. Connect the test light or voltmeter lead to the ignition "I" terminal of the gauge and the other lead to the ground "G" or "GND" terminal of the gauge. If test light lights or approximately 12 volts is indicated on the test meter, the ignition and ground lead connections are good.

b) If test light does not light or there is no reading on the test voltmeter, check the positive 12 volt power source at the key switch of fuse block. If power is available at those points, correct the lead problem or replace any blown fuses.

c) If test light still does not light or voltmeter still shows no voltage, check ground lead and connections by connecting one lead of test light or voltmeter to a known source of B(+) and the other lead to the ground terminal of the gauge. If lamp lights or voltage is indicated on the voltmeter while touching the ground terminal of the gauge, the ground connection to the gauge is good. If lamp does not light or voltmeter does not show voltage, check ground connection to gauge, ground wire, and ground connection to ground source.

2) To test gauge operation and sending unit connections (after performing electrical checks above):

a) Turn key switch to the OFF position. Connect jumper lead between the "S" terminal and the "G" or "GND" terminal of the gauge. Turn the key switch to the ON position. If the gauge registers a full scale reading under those conditions, the gauge is good. If a less than full scale reading is indicated, the gauge is defective and should be replaced.

**Note: European resistance gauges will operate in reverse.**

b) If no reading is indicated, remove the sending unit lead wire from the sending unit on the engine. Turn the key switch to the "ON" position. Ground the sending unit lead wire to a good ground and note the gauge reading. If the gauge registers a full scale reading, the sending unit may be defective.



c) Remove the jumper lead. Remove the sending unit lead wire from the sending unit on the engine. Turn the key switch to ON position. Ground the sending unit lead wire to a good ground and note the gauge reading. If the gauge now (after grounding the sending unit lead wire) registers a full scale reading, the sending unit is defective and should be replaced. See Appendix V & VI.

**NOTE:** Intermittent readings usually indicate loose connections or shorted wiring. Check all connections and wiring if the above checks do not pin point a specific defect.

C. Gauge is Out of calibration - Disconnect sending unit lead wire from gauge. Connect ICSI resistance as shown in the sending unit resistance value table (See Appendix V) between sender (S) terminal of the gauge and ground. Gauge should indicate the approximate range indicated in chart. If the readings on the gauge do not match those on the table (gauge pegs early or doesn't read) and ohms resistance is correct as measured by an ohmmeter, gauge may not be correctly matched to sender, or gauge is out of calibration.

D. Sending Unit is defective - Disconnect the sending unit lead from the gauge "sender" terminal. Using an ohmmeter, test the sending unit resistance per the sending unit resistance value table (See Appendix VI). If sending unit shows "0" ohms or open circuit, check the sending unit at the motor and/or wiring for defects.



# Gauges - Voltmeters

## Operation

A voltmeter indicates the battery voltage and the general condition of the battery charging system. The meter requires no warm-up and indicates voltage changes instantly. See Appendix I for gauge dimensions. Instrument part numbers are located on a label attached to the outside of the case (i.e. VP0000A).

## Troubleshooting

Symptom:

A. Gauge appears to “stick” during operation: - Slightly loosen the nuts holding the backclamp and check operation. If gauge now operates properly and is not loose in panel, the gauge should provide suitable service. If the gauge continues to stick during operation, replace gauge.

B. No voltage reading is noted on the voltmeter:

1. If the indications are normal (engine starts, lamp lights etc.) proceed with this test, otherwise, check the battery voltage with a test voltmeter, or a 12 volt test light.
2. Check for voltage at voltmeter by connecting a test voltmeter or a 12 volt test light to “+” and to the terminals of voltmeter; turn ignition switch on.
  - a) If the light does not light, or if the test voltmeter reads the same as the installed voltmeter, the problem is in the battery charging system or wiring. See the manufacturers shop manual for trouble-shooting procedure.
  - b) If the test voltmeter indicates correct voltage; typically 14 volts with engine running and at least 12 volts with no accessories on and engine off (see engine shop manual for details), then replace the voltmeter.

# Gauges - Ammeters

## Operation

An ammeter indicates the current flow through the battery charging system. A “center zero” ammeter, during charging, shows a (+) positive reading indicating current flowing to the battery (charge). A (-) negative reading indicates current flowing away from the battery (discharge). See Appendix I for gauge dimensions. Instrument part numbers are located on a label attached to the outside of the case (i.e. AP0000A).

## Troubleshooting

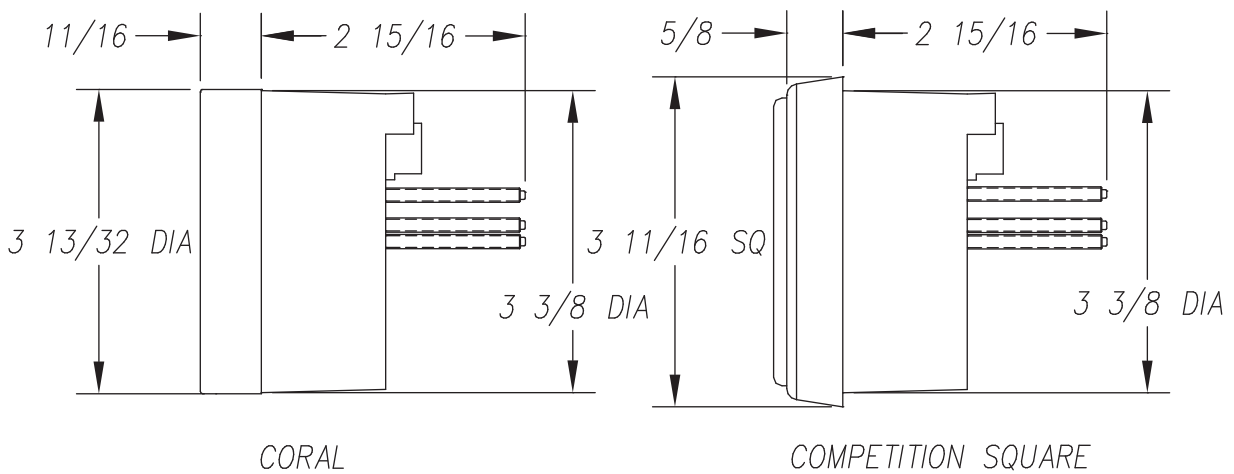
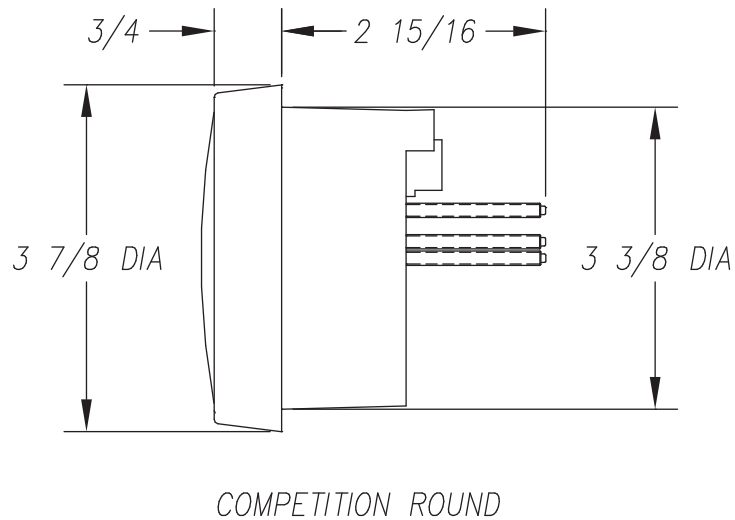
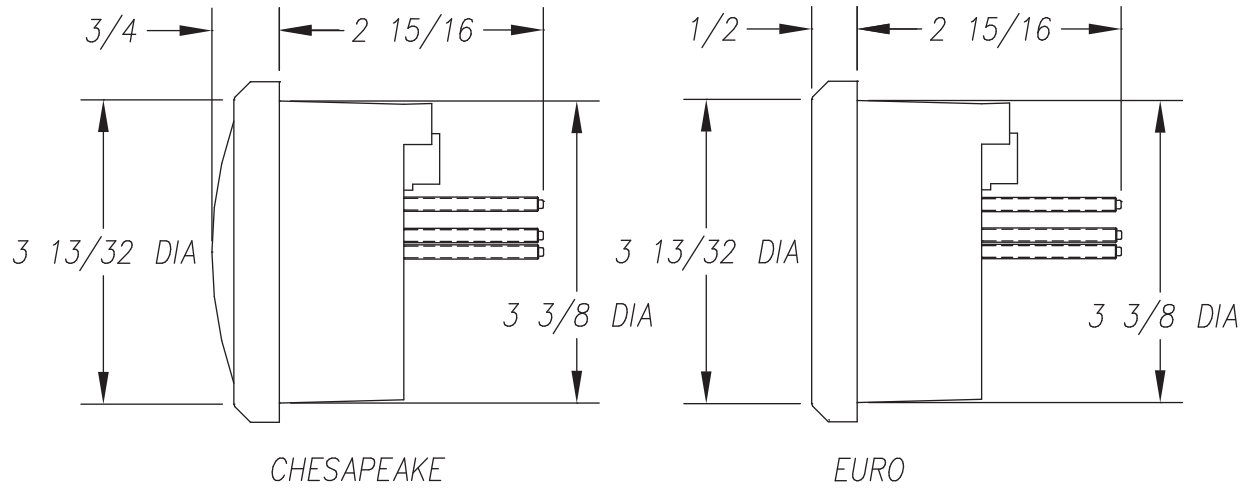
### Symptom

A. Ammeter appears to “stick” during operation - slightly loosen the nuts holding backclamp and check operation. If the gauge now operates properly and is not loose in the panel, gauge now should provide suitable service. If the gauge continues to stick during operation -- replace gauge.

B. The Ammeter reads ‘backward’ - shows (charge) with the engine off with a load on the battery and (discharge) with the engine running. The Ammeter is installed incorrectly. Reverse the leads at the rear of the ammeter.

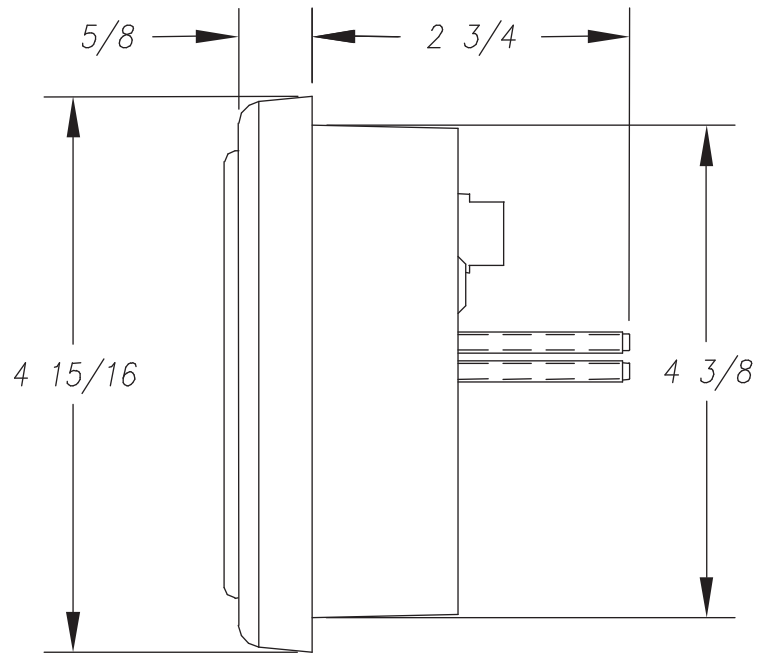
C. Ammeter does not read “charge” or “discharge” - Ammeter is dead (open circuit). Check for a bad connection in the charging circuit that may have caused a surge of current burning out the ammeter. Replace the ammeter.

# Appendix

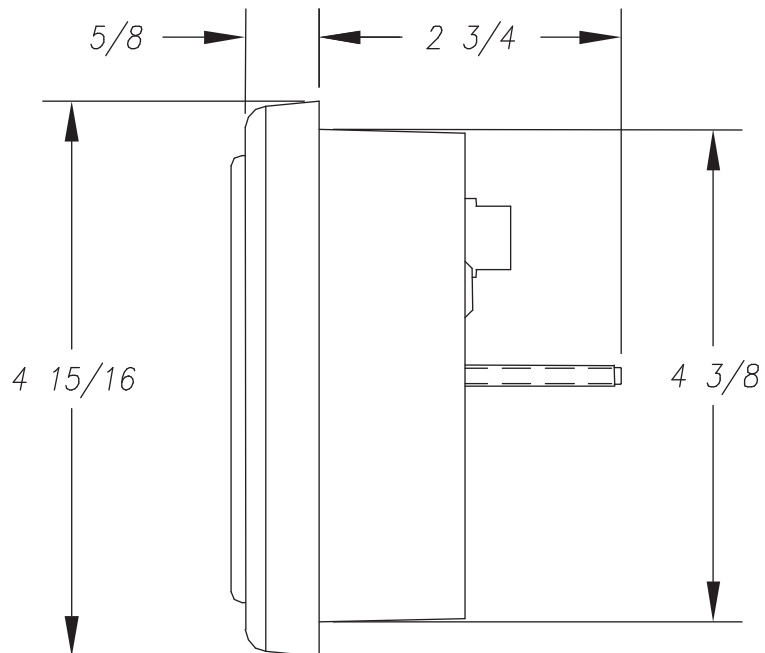


#### 4 - INCH TACHOMETERS & SYNCHRONIZERS

**Note:** Case diameter dimension is panel hole requirement

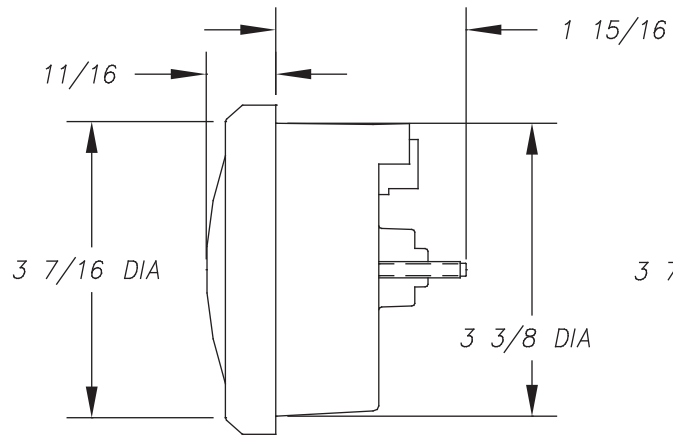


*TACHOMETER & SYNCHRONIZER*

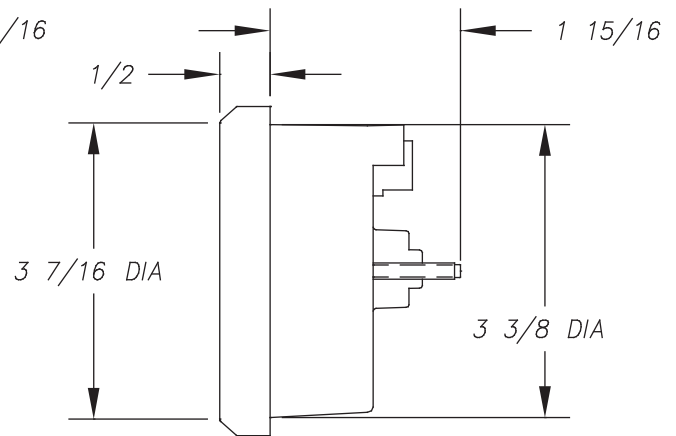


*SPEEDOMETER*

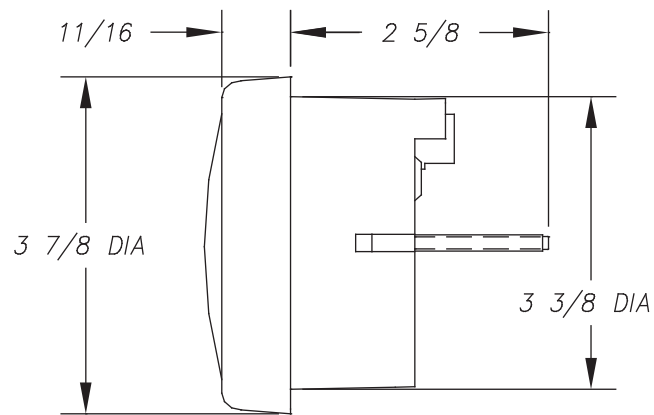
5 - INCH COMPETITION SQUARE  
TACHOMETERS, SYNCHRONIZERS & SPEEDOMETERS  
**Note:** Case diameter dimension is panel hole requirement.



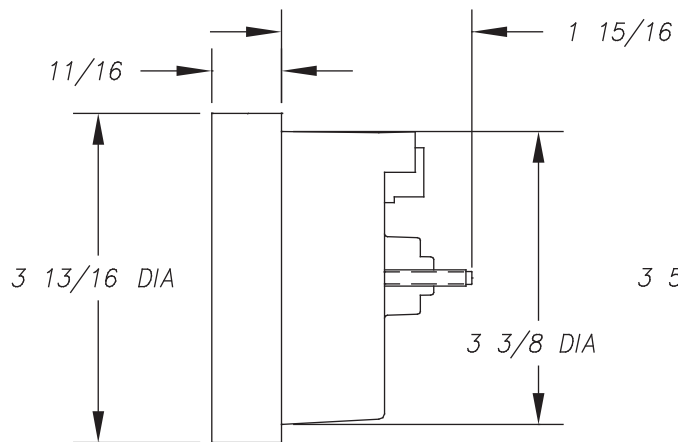
CHESAPEAKE



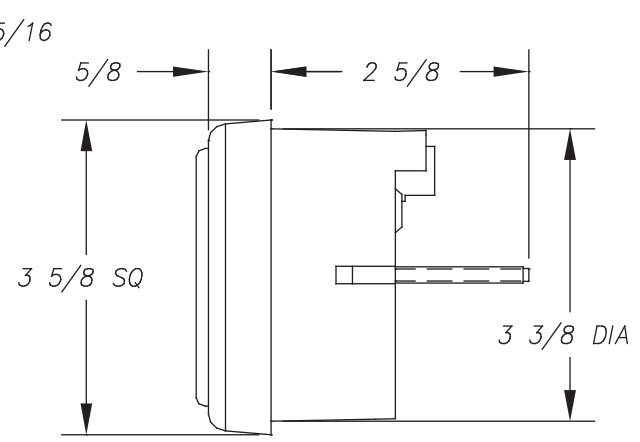
EURO



COMPETITION ROUND



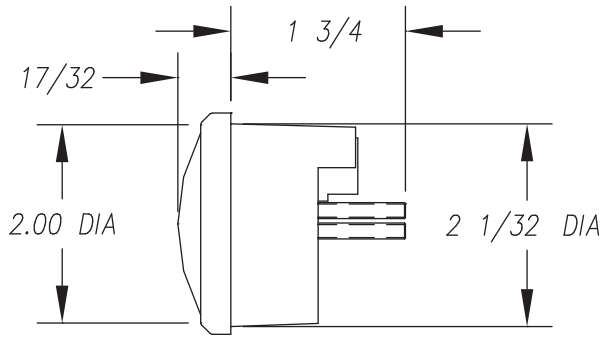
CORAL



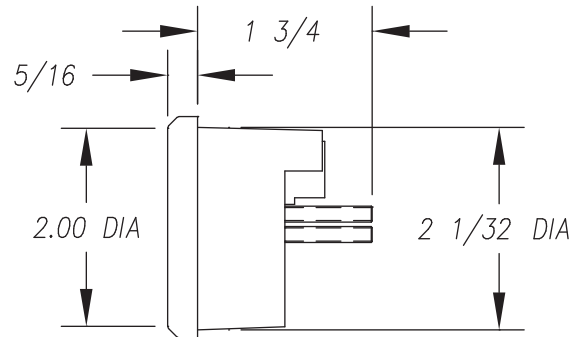
COMPETITION SQUARE

#### 4 - INCH SPEEDOMETERS

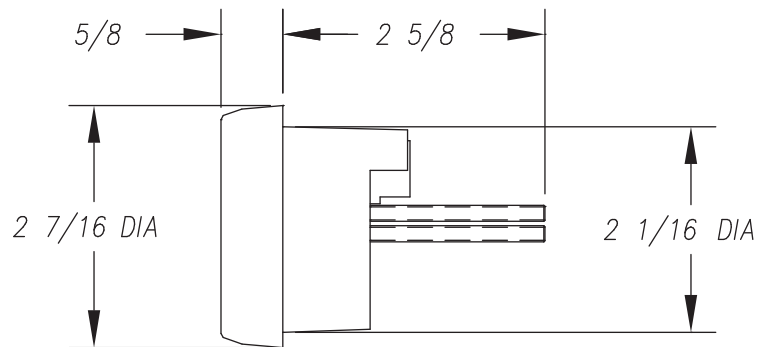
**Note:** Case diameter dimension is panel hole requirement.



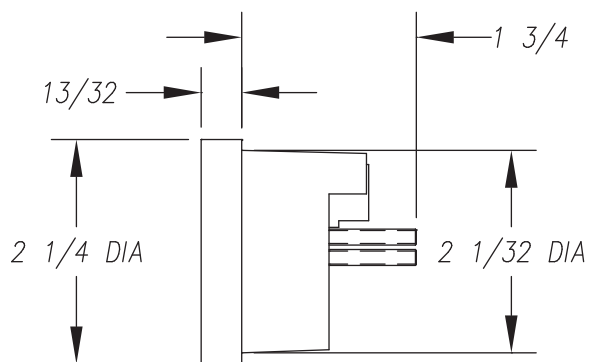
CHESAPEAKE



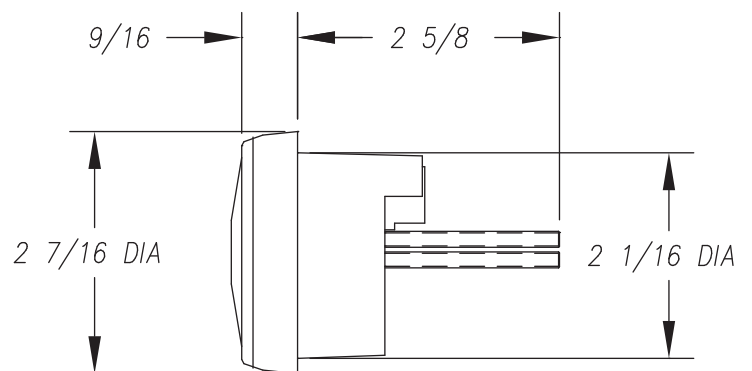
EURO



COMPETITION ROUND



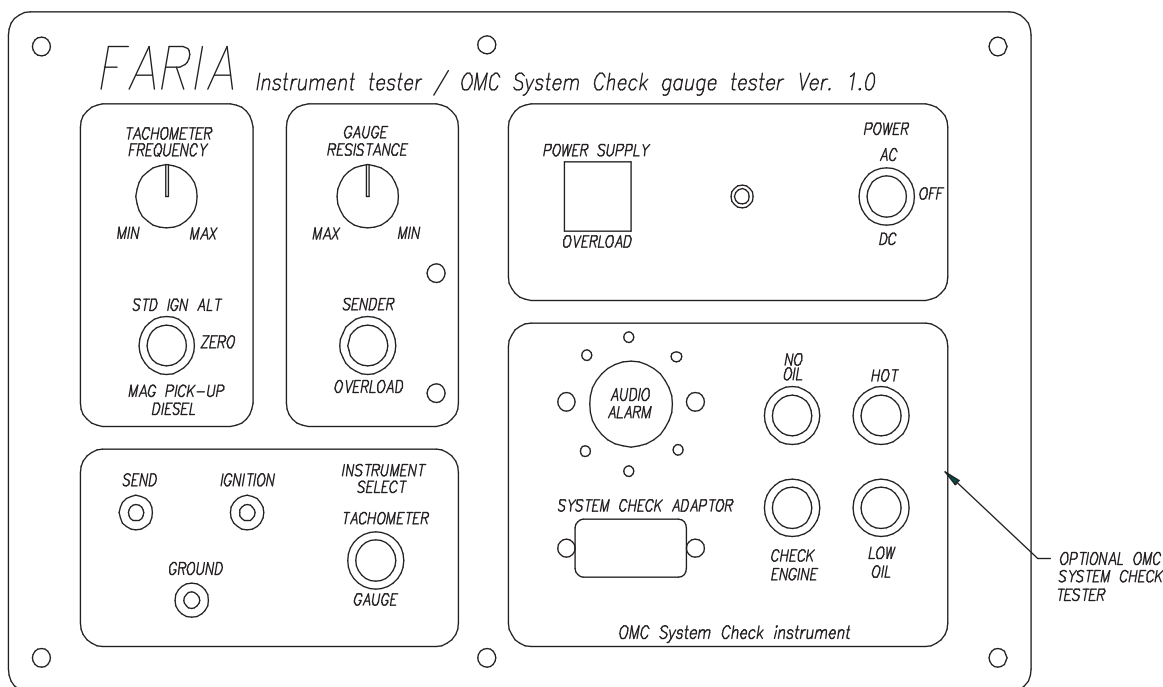
CORAL



COMPETITION SQUARE

## 2 - INCH GAUGES

**Note:** Case diameter dimension is panel hole requirement.



### Description: *Faria® Tachometer and Gauge Tester.*

The *Faria® Tachometer and Gauge Tester* is an engine tachometer (signal) and a gauge (sender) substitution box designed to check the correct operation of engine electrical instrumentation. The unit may be used with a 115VAC or a 12VDC external battery source.

### TACHOMETER FREQUENCY:

Rotate clockwise for increasing revolutions per minute and counterclockwise for decreasing RPM.

### GAUGE RESISTANCE:

Rotate clockwise for decreasing resistance (higher gauge readings in most cases) and counterclockwise for increasing resistance (lower gauge readings in most cases).

### INSTRUMENT SELECT:

With switch “up” toward ‘TACHOMETER’ position; outboard alternator tachometers, inboard and inboard /outboard 4-cycle gas engine tachometers and diesel tachometers driven by diesel pulse generators or magnetic pick-ups may be tested for operation.

With switch “down” toward ‘GAUGE’ position; 12 volt gauges which operate anywhere in the resistance range of 0-1000 ohms may be tested for operation.

**SEND:** (Sender) (*Green*)    **IGNITION:** (+) (Red)    **GROUND:** (-) (Black)

**ZERO:** (STD IGN ALT)/(MAG PICK-UP DIESEL)

[UP] - For 4-cycle gas engines, alternator, and diesel pulse generator signal source tachometers.

[CENTER] - Zero indicating tachometer is “live”.

[DOWN] - For testing diesel tachometers that use a magnetic pick-up as a signal source.

**POWER:** (AC) / (DC) adjacent LED will light indicating power is “on”

[UP] - Selector switch for 115VAC

[CENTER] - Off

[DOWN] - 12VDC external battery power



**To test any instrument: (bench test, out of boat)**

- a.) Plug tester into a 115VAC outlet
- b.) Set 'POWER' switch to "OFF" (center position)
- c.) Insert banana plugs into corresponding color coded connectors on front of box.
- d.) Connect alligator clips to corresponding terminals on rear of gauge or tachometer to be tested; (red to ignition or battery (+) terminal, green to signal or sender terminal, & black to ground (-) terminal)
- e.) Switch 'POWER' switch to "AC" position (up).
- f.) Switch 'INSTRUMENT SELECT' switch to position corresponding to instrument being tested.  
(i.e.: (A) up for all tachometers, (B) down for all gauges ).

**A.) To test a Tachometer;**

- a.) Switch 'STD IGN-ZERO-DIESEL' switch to 'ZERO', tachometer should go to "zero".
- b.) Switch 'STD IGN-ZERO-DIESEL' switch to setting appropriate to tachometer being tested, as described above.
- c.) Start with Tachometer Frequency Adjust control in full counterclockwise position (min.).
- d.) Slowly rotate control knob in a clockwise direction. As tachometer begins to indicate/change RPM reading, continue to rotate knob slowly until the highest reading is obtained. (May be less than full scale.)
- e.) Rotate control counterclockwise until pointer returns to lowest reading (may not be zero); repeat procedure and check for smoothness of operation.
- f.) Set 'POWER' switch to 'OFF' (center) position
- g.) Remove alligator clips from back of gauge.

**B.) To test a Gauge:**

- a.) Start with Gauge Resistance in either full clockwise (min.) or full counterclockwise (max.) position.
- b.) Slowly rotate control knob until gauge pointer moves from initial starting position.
- c.) Continue rotating control knob until gauge reads full scale opposite from initial starting position.
- d.) Return control knob to initial starting position. Pointer should return to original starting position smoothly.
- e.) Repeat test and observe pointer for smoothness of operation.

**To test any instrument: (in a boat, using the boat's 12VDC power)**

- a.) Disconnect the signal wire from the instrument.
- b.) Connect alligator clips to the corresponding terminals on the back of the gauge after positively identifying them visually, with a wiring diagram, or a voltmeter.
- c.) Set 'POWER' switch to 'DC' position (down).
- d.) Turn boat's ignition switch "ON".
- e.) Follow procedure outlined above for tachometer or gauge testing.
- f.) When test is complete, shut boat's ignition switch 'OFF', return 'POWER' switch to 'OFF' (center) position.
- g.) Remove alligator clips from instrument terminals.
- h.) Reconnect the signal wire to the instrument.

**OPTIONAL OMC SYSTEM CHECK TESTER:****To test a System Check Tachometer or Operator Warning System gauge:**

- a.) Plug the tester into a 115V AC outlet.
- b.) Connect the instrument to the test box with the 8 pin connector cable.
- c.) Turn the "POWER" switch to the AC position as described above. The four warning lights will simultaneously come on and alarm will sound once indicating that the lights and alarm circuits are functional. The lights will then sequentially go out from left to right. If a light or the alarm stays on the instrument is defective.
- d.) To further test tachometer sweep proceed as above in section: A.) To test a Tachometer, parts:  
a.) through, e.).
- e.) To test individual warning lights and the alarm for either a tachometer or warning light gauge. Apply a tachometer signal to the instrument as in section: A.) part: d.), press the appropriate light button. If the instrument is working properly the warning light will come on and stay lit and the alarm will sound for 12 seconds. If the light goes out or the alarm stays on the instrument is defective.
- f.) Set "POWER" switch to "OFF" (center) position.
- g.) Remove 8 pin connector cable.

# ABYC - Engine and Accessory Wiring Color Code Guide

Color	Item	Use
Yellow w/red stripe (YR)	Starting circuit	Starting switch to solenoid
Brown w/yellow stripe (BY) or Yellow (Y) - see note.	Bilge blowers	Fuse or switch to blowers
Dark gray (Gy)	Navigation lights Tachometer	Fuse or switch to lights Tachometer sender to gauge.
Brown (Br)	Generator armature Alternator charge light  Pumps	Generator armature to regulator Generator Terminal/alternator Auxiliary terminal to light to regulator Fuse or switch to pumps
Orange (O)	Accessory feed	Ammeter to alternator or generator output and accessory fuses or switches. Distribution panel to electric instruments
Purple (Pu)	Ignition Instrument feed	Ignition switch to coil and electrical instruments Distribution panel to electric instruments
Dark blue(DkBl)	Cabin and instrument lights	Fuse or switch to lights
Light blue (LtBl)	Oil pressure	Oil pressure sender to gauge
Tan	Water temperature	Water temperature sender to gauge
Pink (Pk)	Fuel gauge	Fuel gauge sender to gauge
Green/stripe (G/x)	Tilt down and/or trim in	Tilt and/or trim circuits
Blue/stripe (Bl/x)	Tilt up and/or trim out	Tilt and/or trim circuits

**Note: If yellow is used for DC negative, blower must be brown with yellow stripe.**

# Choosing the Proper Sender

Senders are designated by the following descriptions and must be selected in combinations of one each from A, B, & C.

(For example: Single station, American resistance, Standard ground)

<b>A</b>	Station <sup>a</sup>	Single
		Dual
<b>B</b>	Resistance <sup>b</sup>	American
		European
<b>C</b>	Ground <sup>c</sup>	Standard
		Floating

**Notes:**

- a. Station: It is the sender that is unique in a dual station application. The gauge is the same in either single or dual applications.
- b. Resistance: Choose your sender to electrically match your gauge not just the manufacturer. Some sender manufacturers make both resistance types; and, some instrument manufacturers may use either resistance type depending on the gauge. There is usually no visual way alone to determine the resistance type.
- c. Ground: Standard ground is the most common having battery negative (-) connected directly to the engine block. Sending units may have one (1) terminal (signal). In a floating ground system, the battery negative is not connected to the engine block so merely threading in the sender does not supply ground. Floating ground senders will have two (2) terminals (signal & ground). Both sender terminals may be wired to the appropriate gauge terminal or the sender's ground may be wired directly to the battery negative. A floating ground sender may be used in a standard ground system but not vice versa.

For technical assistance, contact *Faria® Marine Instruments* Customer Service between 8:30 a.m. and 5:00 p.m. Eastern time weekdays at (860) 848-9271 or (800) 473-2742.

## Outboard Tachometer Applications

Make / Year	Model	# of Poles
<b>Chrysler</b> 1968 - 1983	35 HP, 70 HP & up	12
	55 & 60 HP	20
<b>Force</b> 1984 - 1999  Some older Force engines are 20 pole (see note f.)	50 HP through early 1987 (A,B models)	8
	35 HP (1986 & later)	12
	40 HP (1991 & later)	
	50 HP (1992 B models & later)	
	70 HP (1991 & later)	
	90 - 120 HP L-Drive (1991 B & later)	
<b>Honda</b> Through 2010 Older tiller models require Honda jumper wire 32197-ZH8-003, BF 40/50 HP require 06383-ZV5-315 Tach Kit (thru 2005)	BF 75/100A, BF 8A, BF 9.9/15A HP	4
	BF 25/30, BF 75/90 HP	
	BF 40/50 (2006 and later)	
	BF 115/130 HP	6
	BF 135/150 HP, BF 200/225 HP	
	BF 35/45, BF 40/50 HP (thru 2005)	12
<b>Mercury/Mariner</b> 1977 - 2010 (See note "e") *Use Tach adapter #17461A9 Service #17461T9 **Use Tach adapter MM #17461A8 or A10 Service #56-883040A1  SmartCraft requires AGI converter for Analog Gauges.	18,25,48,60HP Mariner through 1983	4
	8, 9.9, 15 and 25 HP (4 stroke)(after 1998-2004)	
	Less than 40 HP - All Before 1999	6
	40 HP(serial # 582399 and before)	
	8, 9.9(Before 1999 and after 2005)& 50HP(4 stroke)	10
	6 to 25 HP 1999 & up, *2002 & up	
	25 HP & 30 HP (4 stroke)	12
	40 HP (after serial # 582399)	
	45 HP (1987), 50-60 HP (4 stroke EFI)	
	50 HP & above, ** 75, 90,115 HP (4 stroke EFI)	
	135, 150, 200, 225 HP, DI	
	3.0L EFI 225 & 250 HP	
	Pro Max 3.0L 300 HP EFI	
<b>Evinrude/Johnson</b> 1977 - 2010 for 88 HP {90} & 112 HP {115} a voltage reg. kit is recommended. A System Check Tach or 2" gauge is required	9.9 HP -15 HP 4 stroke after 2001	6
	All 2 cylinders less than 70 HP	10
	9.9 HP & 15 HP (2 cylinder)(4 stroke)	12
	25-35 HP 3 CYL	
	40-50 HP, 2 cylinder (1993 & later)	
	60 HP, 3 cylinder (1985 & later)	
<b>Suzuki</b> through 2010 A System Monitor Tach or 2" gauge is required	70 HP & greater, including sea drives	
	All FICHT models	
	All E-Tech 40 HP - 250 HP	
	Less than 55 HP - All, DT55, 2-Stroke Models	4
	60 HP, 65 HP thru 1985, DT 2-Stroke Models	
	50 - 60 HP Cabrea, DT 2-Stroke Models	6
	DF 2.5 through DF 15, DF 25 V(TWIN) 2006 & later	
	25 HP & 30 HP (1993 & later) DT 2-Stroke Models	12
	55 HP & 65 HP (1985 & later) DT 2-Stroke Models	
	75 HP & up (1985 & later) DF 25 through DF 30 (3 Cyl Models), DT 2-Stroke Models	
	75 HP and up (Cabrea ) DT 2-Stroke Models	
<b>Tohatsu / Nissan</b> through 2010 (See note "e").	115 HP and up (1988 & later), DT 2-Stroke Models	12
	DF 40 through DF 250, (4 stroke) ALL	
	(2 strokes) 8 HP, 9.8, 9.9, 15, 18, 25, 30, 40C, M40C or less (all 2 cylinder)	4
	All TLDI 40 through 115	6
<b>Yamaha</b> 1984 - 2010  S250B and V8 four stroke will not support a conventional tachometer.	(2 strokes) M40D,40D2, 50D, 50D2, 70B and CM90A (all 3 cylinder)	
	(4 strokes) MFS20 or less	12
	(2 strokes) 115 HP, 120 HP, 140 HP, M115A-M140A (all 4 cyl.)	
	(4 strokes) 8, 9.8, 9.9, 15, 18, 25 & 30 HP, EFI 25, 30, MFS25/30 (3 cyl)	4
	6 HP - 25 HP (2 cyl '84-'87), F/T 9.9 ('85-'91)	
	C25 - C55 (2 cyl) Except C30 (2cyl '93-'97)	6
	F/T 9.9 (MID '92 on), C30-C70 (3 cyl)	
	C30 (2 cyl '93-'97), 25 HP (3 cyl),	12
	25 HP (2 cyl '88-'05)	
	C/P/E 30-70, F8, F15, F20	12
	F/T 25-F250, HPDI 150-300, 80-SX250	
	F/T 9.9 (early '92), C75-C150, P75-P200	12
	V/VX 150-250, F15C/F20	

Notes:

a. 6000 RPM tachs are for Inboard & I/O gas engine applications only

b. 7000 RPM & 8000 RPM tachs are for all outboard motor applications only. 20 Pole Tachs are no longer available.

c. Electrical pulses per revolution are equal to 1/2 the number of alternator poles.

d. Older model outboards (prior to 1977) may have the tach signal wire originating at the ignition system though they are alternator equipped. All alternator tachometers may be used on these systems by disconnecting the tach signal wire at the engine and connecting that wire to the unrectified alternator signal at the rectifier. Be certain the number of alternator poles match the tachometer pole setting of the tach.

e. TOHATSU recommends, when using aftermarket tachs on TLDI engines, using indicator light kit part number 3Y9762510 and Harness 3T5710420. Strong alternator interference on some TOHATSU / NISSAN outboards and some pre 2001 Mercury 90HP outboards may require wiring a .1mf, 100 volt non-polarized capacitor between the signal and ground stud terminals.

f. Faria no longer makes a 20 pole tach.

### 7000 RPM Outboard Tach

OB	ALT	SWITCH	SETTING
1	-	4	POLE
2	-	6	POLE
3	-	8	POLE
4	-	10	POLE
5	-	12	POLE
SLIGHTLY DEPRESS WHILE TURNING			

### 6000 RPM w/12 Pole option

ENG.	CYL.	SWITCH	SETTING
1	-	4	CYL
2	-	6	CYL
3	-	8	CYL
4	-	12	POLE OB ALT
SLIGHTLY DEPRESS WHILE TURNING			

# Sending Unit Resistance Values

<b>TRIM GAUGE</b>	<b>UP</b>	<b>MID</b>	<b>DOWN</b>
	<i>ohms</i>	<i>ohms</i>	<i>ohms</i>
Mercury / Force	160	38.7	10
Force (70 & 75 HP only)	10	20.6	41.8
Johnson/Evenrude Outboard	10	44	88
Suzuki 4 Stroke 1999 (And newer)	2.5	44	88
OMC Cobra Stern	70	29.5	11
OMC Sea Stern Drive	88	44	10
Yamaha 1996	450	240	100
Yamaha 1997-2000	550	330	100
Yamaha 2001 (And newer)**	280	150	10
Volvo SX Cobra	146	---	11
Volvo SX (MD Mod)	70	---	3
Volvo SX (HU Mod, NC Mod)	146	---	11
Volvo DP (White)*	180	---	10
Volvo DP-S (NC Mod)*	146	---	11

\* Uses "Black Box" for Trim signal

\*\* A Mercury Trim Gauge may be used, "Trim" will be the full range of the gauge.

All resistance values shown for Oil Pressure, Water Temperature & Fuel gauges are for single station.

(Dual station senders have 1/2 the resistance value of single station senders.)

<b>OIL PRESSURE GAUGE</b>	<b>0-80 psi</b>		<b>0-100 psi</b>		<b>0-150 psi</b>		<b>350 psi</b>		<b>0-400 psi</b>	
	<b>(5-Bar)</b>		<b>(7-Bar)</b>		<b>(10-Bar)</b>		<b>(25-Bar)</b>			
	<i>psi</i>	<i>ohms</i>	<i>psi</i>	<i>ohms</i>	<i>psi</i>	<i>ohms</i>	<i>psi</i>	<i>ohms</i>	<i>psi</i>	<i>ohms</i>
American Marine Sender	0	240	0	240	0	240			0	1
	40	103	40	103	75	103			200	44
	80	33.5	100	33.5	150	33.5			400	88
European Marine Sender	0	10			0*	10	0	10	0*	10
	40	95			90	112	12.5	95	200	95
	80	180			150	180	25	180	400	180

\* For use with Competition series 150 psi, 400 psi & Dress White 400 psi

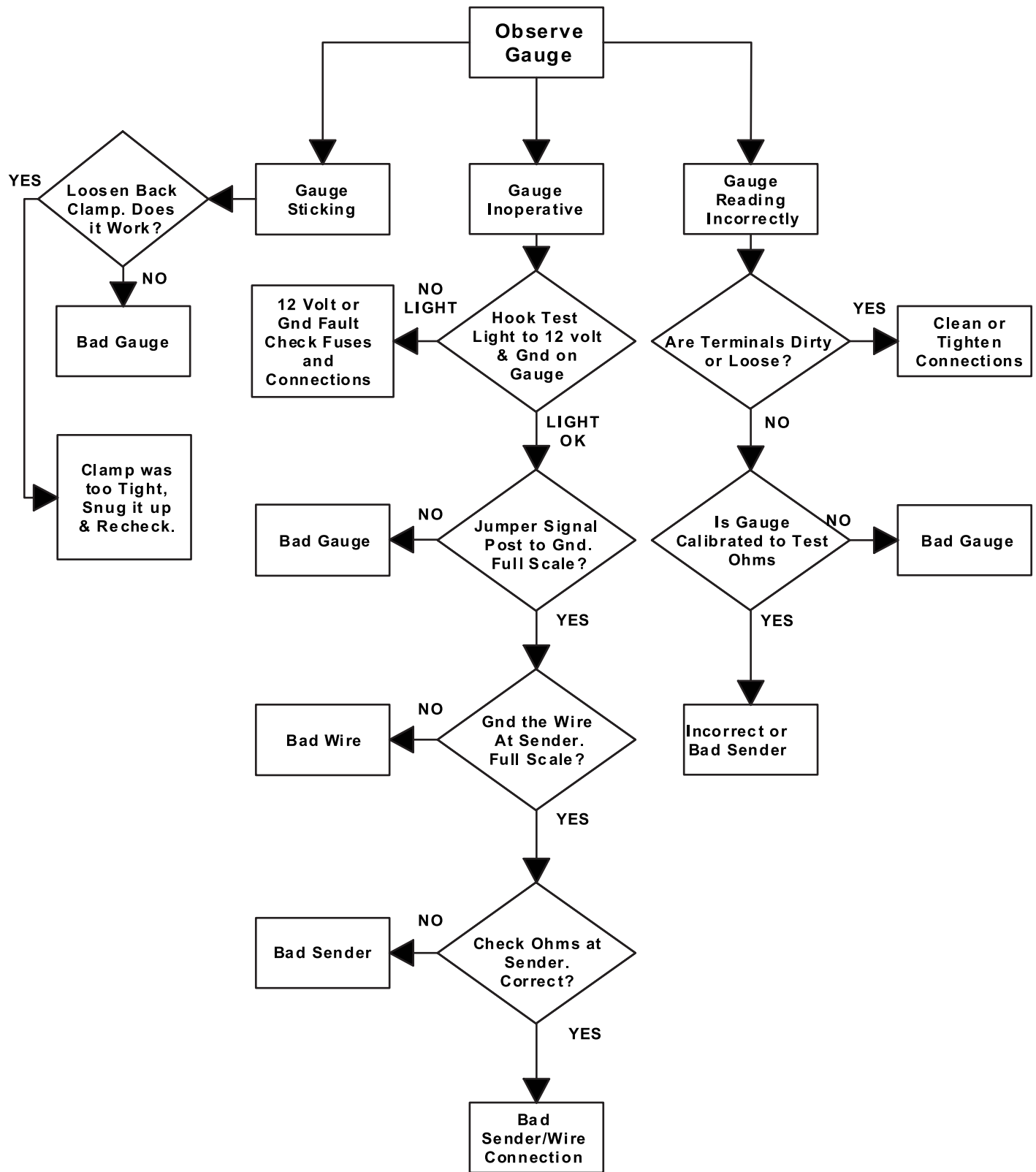
<b>WATER TEMPERATURE</b>	<b>100°F - 250°F</b>		<b>40°C - 120°C</b>	
	°F	<i>ohms</i>	°C	<i>ohms</i>
American Marine Sender	100	450	40	450
	175	99	65	99
	250	29.6	120	29.6
European Marine Sender			40	281
			80	68
			120	22

<b>FUEL LEVEL</b>	<b>EMPTY</b>	<b>MID</b>	<b>FULL</b>
	<i>ohms</i>	<i>ohms</i>	<i>ohms</i>
American Marine Sender	240	103	33.5
European Marine Sender	10	95	180

<b>CYLINDER HEAD TEMP</b>	<b>60°F - 220°F</b>		<b>20°C - 100°C</b>	
	°F	<i>ohms</i>	°C	<i>ohms</i>
Faria® Marine Sender Only (Single Station Sender)	60	1195	20	1040
	140	192	60	192
	220	46.5	100	56

<b>RUDDER ANGLE INDICATOR</b>	<b>PORT</b>	<b>MID</b>	<b>STARBOARD</b>
	<i>ohms</i>		<i>ohms</i>
Sender	10	95	180

# Troubleshooting Quick Reference



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