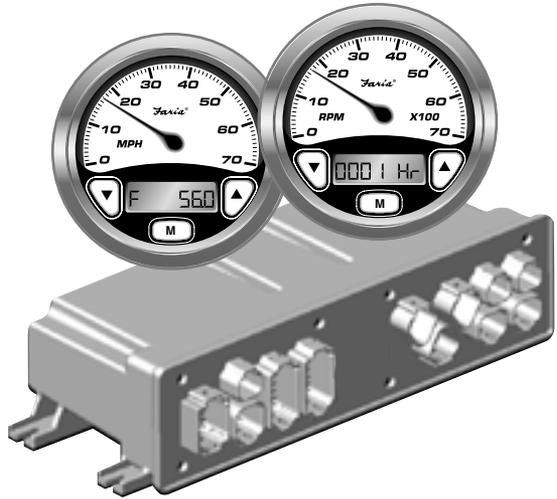


**Garmin®**

**MARINE  
INSTRUMENTS**

# Owner's Manual



## **GW0020 Gateway with Perfect Pass for CorrectCraft® Pleasurecraft GM Engines**

**IS0232**  
rev. A ecr#6148 06/2006



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# Gateway

## Standard Operating Conditions

**Voltage:** 12 - 24V System,  
10.5 – 28 VDC, (10.5 – 32 V operating, 36 V max operating, 1 Hr.)

**Temperature:** -40° - 185° F

**Humidity:** 0% - 98% Rel

**Shock Resistant** per MIL-STD-202, 50G

**Vibration Resistant** per SAE J1455

**Water and Weather Resistant**

**Corrosion Resistant** per ASTM-B117-73, 48 Hr

## System

The system consists of:

- One gateway box to interface with the J1939 bus from the engine ECU and external senders and sensors.
- One five inch tachometer / fuel monitor
- One five inch speedometer / depth sounder
- optional second five inch speedometer
- Various 2" instruments as desired
  - voltmeter
  - oil pressure gauge
  - engine temperature gauge
  - fuel gauge
  - others as specified

## Initial Setup

The setup function is normally only used for a new installation. It is not required to follow this procedure every time the instruments are turned on.

The tachometer is used to initialize the fuel tank size required for the fuel management function. Press the 'M' mode button while the power is turned on, to enter the "setup" mode.



The LCD will show the current fuel tank size selection. The choices are displayed with the up or down buttons. After selecting the closest tank size, press and hold the 'M' mode button for 3 seconds to save the selected size and start normal instrument operation.



Select from one of the following fuel tank capacity options:

- 29 gallon
- 30 gallon (default)
- 35 gallon
- 39 gallon
- 50 gallon

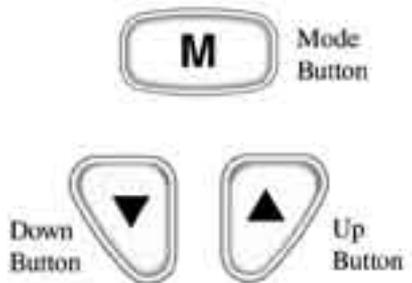
## Operation

### General

The Faria Serial Bus system is designed to receive information from the engine ECU and various individual sensors throughout the boat. This information is transformed into digital data which is distributed to analog and digital instruments via a single cable consisting of two shielded, twisted pairs of conductors.

Each instrument selects the data which is applicable and displays it as if it was being received from the sender directly. One of the two pairs of conductors carries the data while the other pair of conductors carry the power for the instruments.

The tachometer and speedometer each have three push buttons which allow the different functions of each instrument to be activated. Following is a description of these functions.



## Speedometer / Depth Sounder

The Serial Bus Speedometer / Depth Sounder provides both the functions of a speedometer and a depth sounder. The analog speedometer is a stepper motor instrument which looks like a standard analog device but which is actually a digital instrument. On small pointer movements you may occasionally see the pointer moving in the one third degree “steps” that represent the accuracy of the instrument.

### Speedometer Calibration

The analog speedometer displays the speed of the boat through the water. The speedometer is calibrated at the factory for normal installations. As variation has been found in various installations, the speedometer can be easily calibrated to a known reference such as a radar gun or GPS.

When the unit is operating in normal mode (i.e. speed information on the LCD), push and hold the ‘M’ mode button down for 2 seconds will cause the speedometer to go to the calibration mode.



The LCD will show “ADJUST”.



Run the boat at a constant 30 MPH as measured by the GPS or radar. Adjust the speedometer pointer by pressing the “UP” or “DOWN” arrows until the speedometer matches the GPS or radar speed.



When finished, press the ‘M’ mode button to exit the adjustment screen. The operator has the option of saving or canceling the adjustment procedure. The options can be selected using the “UP” or “DOWN” push buttons. To save the calibration setting, press and hold the ‘M’ mode button for 2 seconds when the display shows “SAVE”.



To exit the adjustment procedure without saving, press and hold the ‘M’ mode button



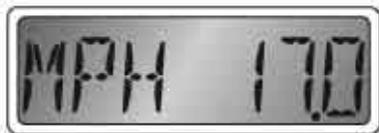
for 2 seconds when the display shows “NO SAVE”.



Multiple runs in opposite directions may be necessary to compensate for errors due to water currents.

## Paddle Wheel Operation

The system is designed to be operated with a paddle wheel for speed sensing.



## Depth Sounder

The depth sounder is turned on and off with the ignition switch. The depth sounder can also be turned off at any time, while in depth display mode, by pressing and holding the 'M' mode button while the depth sounder counts down a three second delay.



The depth display will then indicate "OFF".



Press and hold the 'M' mode button to turn the depth sounder back on.



The LCD screen displays the depth sounder data. When there are no alarm conditions, the water depth is displayed. If the signal is weak or lost, or there is no transducer connected, then the display will alternate between the last known depth and four horizontal bars.



## Canceling depth alarms

A depth alarm warning can be temporarily canceled by pressing both "UP" and "DOWN" arrows on the speedometer, simultaneously.



After one minute, the alarm will resume if the condition that caused the alarm is not corrected. The operator can cancel the alarm as many times as necessary, until the condition is corrected.

The depth alarm warning will replace any information on the LCD screen. Canceling the alarm will restore the LCD to the original display. If not already in the depth mode, this would be a good time to switch to it (using the "M" mode button) in order to monitor water depth.



## Depth Sounder Alarm Settings

*Note: Speedometer display must be in depth display mode to change settings.*

To change the depth sounder alarm settings the "M" mode button must be held down until the depth display changes to the alarm settings mode.



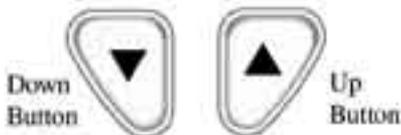
There are four menus in the alarm settings mode. Pressing and releasing the mode switch quickly will cycle through the different options.

## Shallow alarm

Alarm sounds when water depth equals or is less than set value. The display will show “S X.X” which is the current setting for the shallow alarm.



Pressing the “Up” or “Down” buttons will change the shallow setting.



Holding the “mode M” button in for 2 seconds will save the new shallow setting and change the display back to the normal depth mode.

**Set to zero to disable alarm.**

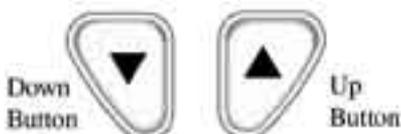


## Deep alarm

Alarm sounds when water depth equals or is greater than set value. The display will show “d XX.X”, which is the current setting for the deep alarm.



Pressing the “Up” or “Down” buttons will change the deep setting.



Holding the “mode M” button in for 2 seconds will save the new deep setting and change the display back to the normal depth mode. Set to zero to disable alarm.

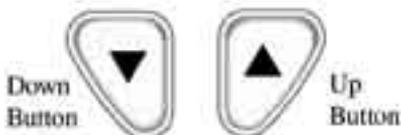


## Keel offset

Adjust depth sounder to measure depth below keel or drive instead of sensor. The display will show “K X.X” which is the current setting for the keel offset.



Pressing the “Up” or “Down” buttons will change the keel offset setting.



Holding the mode button in for 2 seconds will save the new keel offset setting and change the display back to the normal depth mode.



## Units

Change the unit of measure.

The display will show “UNIT FT” for feet,



“UNIT FA” for fathoms,



or “UNIT M” for meters.



Pressing the “Up” or “Down” buttons will cycle through the choices.

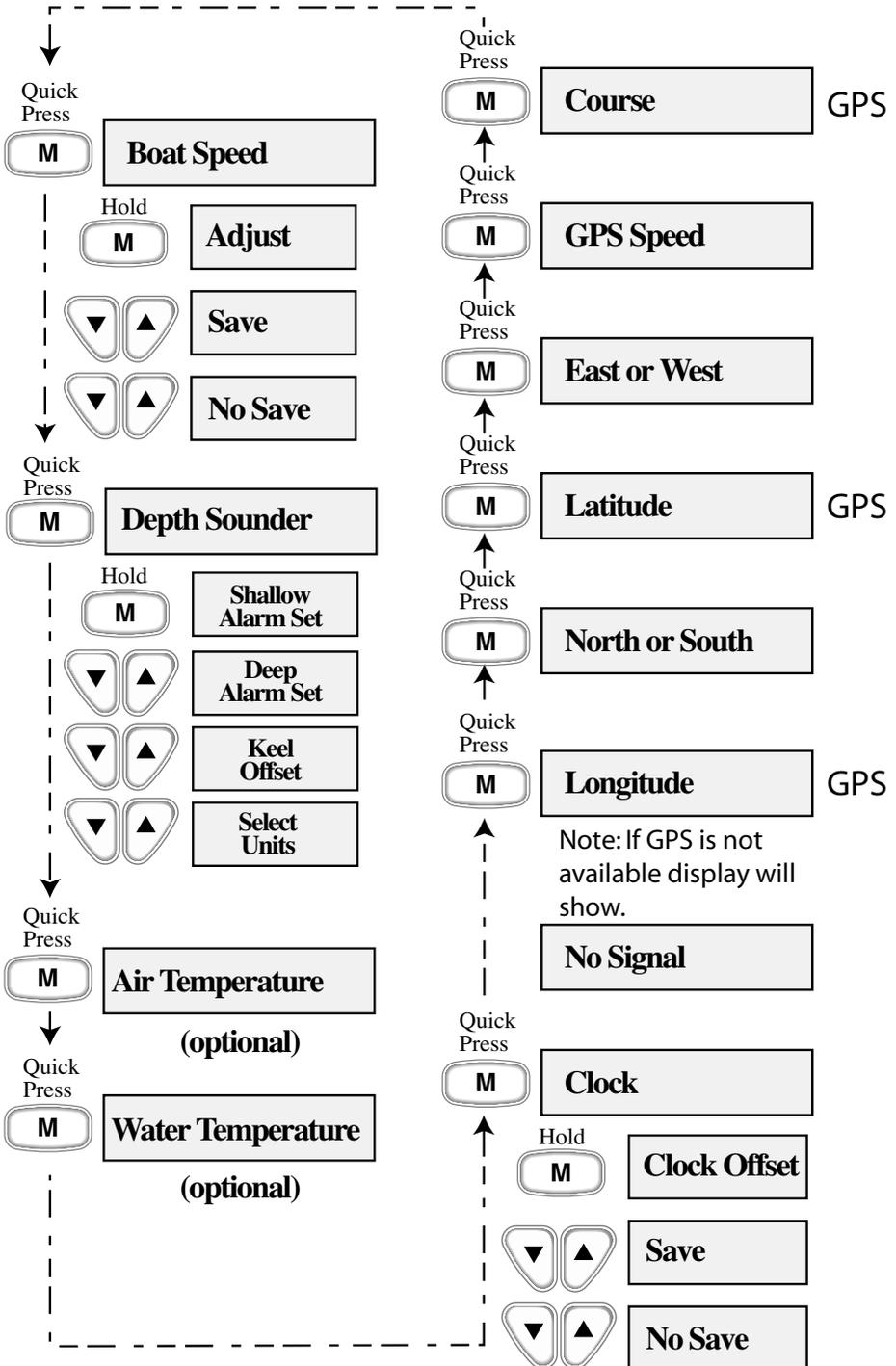


Pressing and holding the “mode M” button will save the units shown in the display and change the display back to the normal depth mode.



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# Speedometer Display Sequence Figure 1



## Tachometer / Fuel Management

The Serial Bus Tachometer/Fuel Management instrument provides both the functions of a tachometer and a fuel - engine monitoring system. The analog tachometer is a stepper motor instrument which looks like a standard analog device but which is actually a digital instrument. On small pointer movements you may occasionally see the pointer moving in the one third degree “steps” that represent the accuracy of the instrument.

The tachometer LCD screen displays several functions. The displayed data includes “engine hours”, “time remaining”, “engine temperature”, “oil pressure”, and “system voltage”, and engine alarm conditions. Pressing the “M” mode button will select the various functions as shown in the diagram below.



- malfunction
- 10) Throttle position sensor (TPS) malfunction
- 11) Coolant sensor malfunction

Alarm messages will be displayed on the tachometer LCD display. Messages 1-5 will also include a flashing red light. All messages will be displayed until either the problem is corrected or the operator manually cancels the warning message.

### Canceling system alarms

To manually cancel system warning messages, simultaneously press both the ‘Up’ and ‘Down’ buttons on the tachometer.



The “time remaining” display shows how many hours the boat can operate based on the fuel remaining in the tank and the current fuel usage rate. In order to minimize “false” alarms, the “low fuel” and “low voltage” alarms only function when the engine is known to be running based on the presence of tachometer data.

Several alarm conditions may also be shown in the LCD display when needed:

- 1) Low fuel
- 2) Low oil pressure
- 3) High engine temperature
- 4) Low voltage
- 5) Engine RPM reduction due to engine controller command
- 6) RPM limit
- 7) Knock sensing system malfunction
- 8) Manifold pressure sensor (MAP) malfunction
- 9) Manifold temperature sensor

This will disable the warning message temporarily. If the problem is not corrected in 1 minute (5 minutes for low fuel), the warning will be displayed again. The operator can cancel as often as desired.

### Engine Hourmeter

Displays the number of hours that the engine has been operated. The display will show “XXXX.XHr”



### Hours Remaining

The “time remaining” display shows how many hours the boat can operate based on the fuel remaining in the tank and the current fuel usage rate.



### Engine Temperature

Displays the Coolant Temperature of the Engine. There are no adjustments available.



### Voltmeter

Displays the System Voltage. There are no adjustments available.



### Oil Pressure

Displays current Oil Pressure. There are no adjustments available.



### Instrument Lights

The navigation light switch must be on for the instrument lights to function. The 'Up' and 'Down' buttons on the tachometer control the instrument lighting brightness.



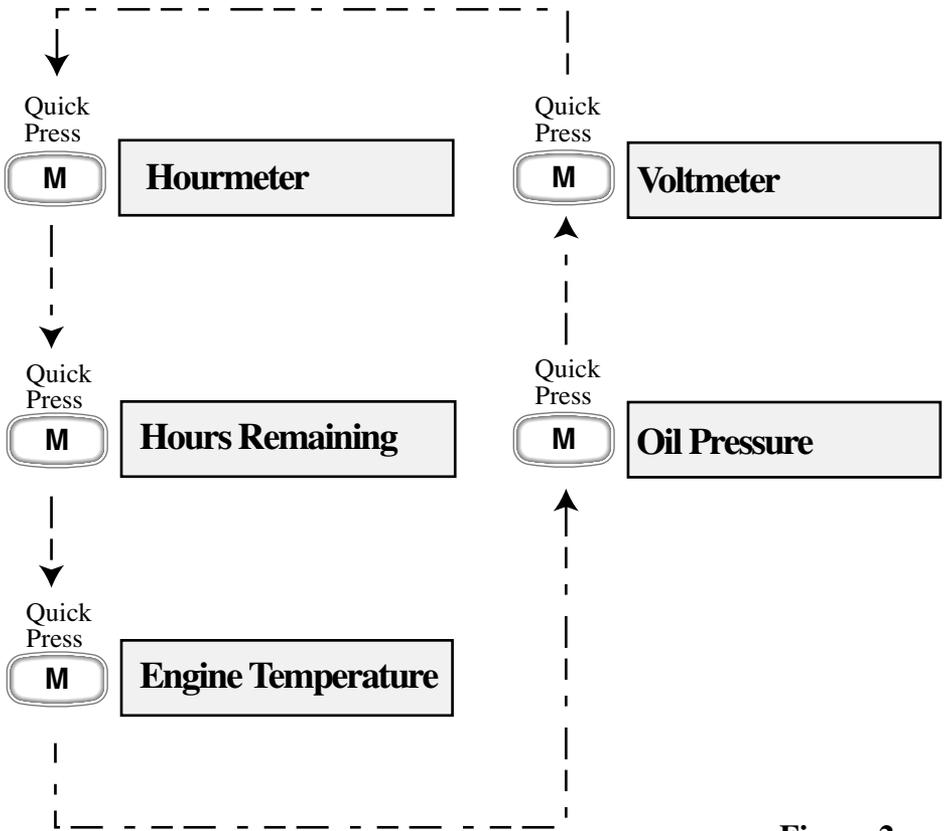
Pressing the 'Up' button increases light intensity.



Pressing the 'Down' button decreases light intensity.



# Tachometer Display Sequence



**Figure 2**

## LCD Alarm Condition Displays.

Alarm messages will be displayed on the Tachometer LCD display. All messages will be displayed until either the problem is corrected or the operator manually cancels the warning message.

Messages will display as a many screens shown sequentially,

## Canceling System Alarms

To manually cancel system warnings messages, simultaneously press both the “Up” and “Down” buttons on the



tachometer. This will disable the warning message temporarily. If the problem is not corrected in 1 minute (5 minutes for low fuel), the warning will be displayed again. The operator can cancel as often as desired.

## Severe Conditions- Includes a Flashing Red Light

**Low Battery Voltage (Flashing Red Light)** (Local Warning)



**High Engine Temperature (Flashing Red Light)** (PGN 65226 SPN 110 FMI 0)



**Low Oil Pressure (Flashing Red Light)** (Local Warning)



**Low Fuel Level (Flashing Red Light)** (Local Warning)



**RPM Reduction in Progress (Flashing Red Light)** (PGN 65226 SPN Any Amber)



## Warnings

**Engine Speed Limiter Active** (Local Warning)



**Knock Detection System Malfunction** (PGN 65226 SPN 731 FMI 2,4)



**Manifold Pressure System Malfunction** (PGN 65226 SPN 106 FMI 4, 16)



**Manifold Air Temperature Sensor Malfunction** (PGN 65226 SPN 105 FMI 3, 15)



**Throttle Position Sensor Malfunction** (PGN 65226 SPN 51 FMI 0, 1, 3, 4)



**Coolant Temperature Sensor Malfunction** (PGN 65226 SPN 110 FMI 3, 4)



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## GW0020 J1939 PGN's

Function	PGN	Bytes
Engine Speed	61444	4,5
Fuel Flow (G/H)	65266	1,2
Oil Pressure	65263	4
System Voltage	65271	5,6
Coolant Temperature	65262	1
Engine Hours	65253	1,2,3,4

## GW0020 J1939 Warnings

Function	PGN	SPN	FMI
Over Temperature	65226	110	0
Coolant Temperature	65226	110	3,4
TPS	65226	51	0,1,3,4
MAT	65226	105	3,15
MAP	65226	106	4,16
Knock Sensor	65226	731	2,4
Rev Limit Active	65226	Any Amber	N/A

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# Faria Serial Bus Installation and Wiring Guide (Pleasurecraft Engines)

The system consists of:

- One Gateway box to interface with the J1939 bus from the engine ECU and external senders and sensors.
- One 5” Tachometer with Fuel Monitor
- One 5” Speedometer with Depth Sounder
- One 5” Optional Speedometer
- Various 2” instruments, including but not limited to
  - Voltmeter
  - Oil Pressure gauge
  - Engine Temperature gauge
  - Fuel Level gauge
  - others as specified.

## Installation

Installation of the Faria Serial Bus system is accomplished as follows:

### Gateway Box

The “gateway” box is the central unit of the system. As all of the senders and other information source peripherals connect to the “gateway”, the “gateway” box should be mounted in a protected area in the best location to provide the maximum cabling benefit.

The “gateway” box power cable must be installed to allow connection to “battery positive” (always on), “battery negative” (ground), and a source of “switched power” which turns on with the engine ignition switch (see Figure 3 and Table 1).

The “Faria Bus” cable must be routed from the “gateway” box to the instrument panel area to connect the instruments to the data bus and instrument power (see Figure 4).

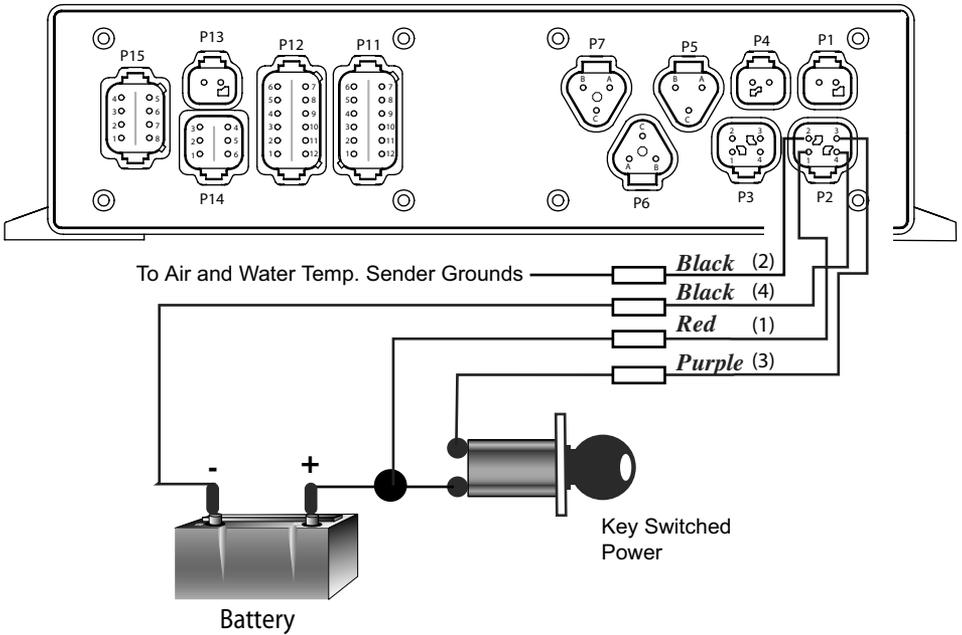
The remainder of the connections to the “gateway” box are described below.

### Instruments

The instruments are mounted using the provided back-clamps and mounting hardware. Each instrument comes with a bus connection cable (12”). The main “Faria Bus” cable from the “gateway” box is connected to the most convenient instrument using either of the two four (4) pin connectors provided on the instrument case (\*except when a Faria Serial Bus Pilot or a Faria Speedometer-PerfectPass Cruise instrument is installed, see note below).

Each additional instrument is connected to the previous instrument using one of the 12” bus connection cables. The cable may be connected to either of the two connectors provided on the instrument case (see Figure 2).

**Figure 3**  
**Typical Power Connections**



**Figure 4**  
**Typical Instrument Connections**

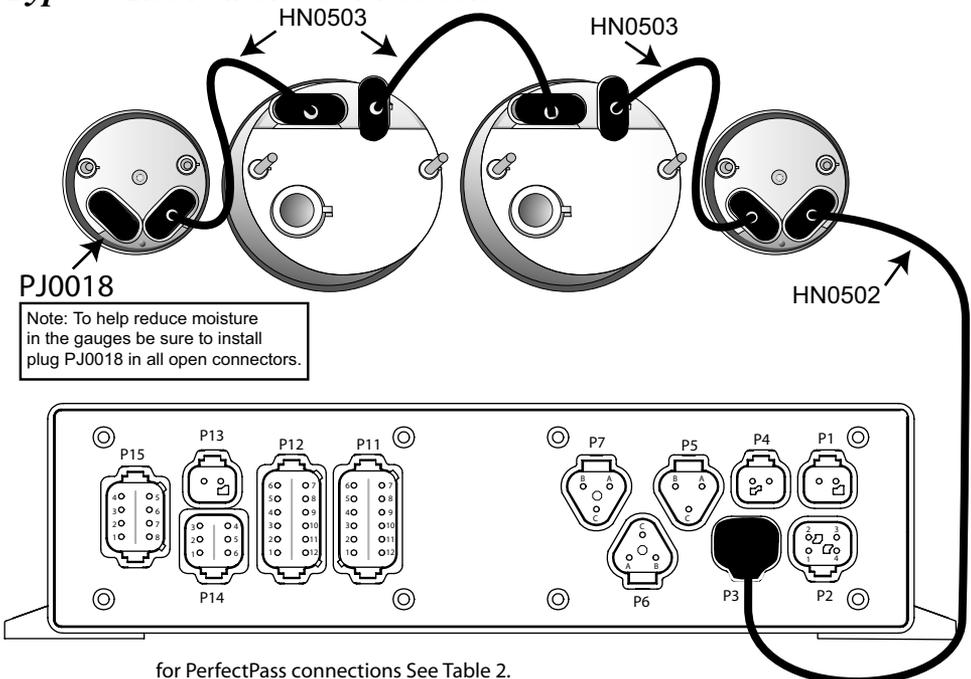
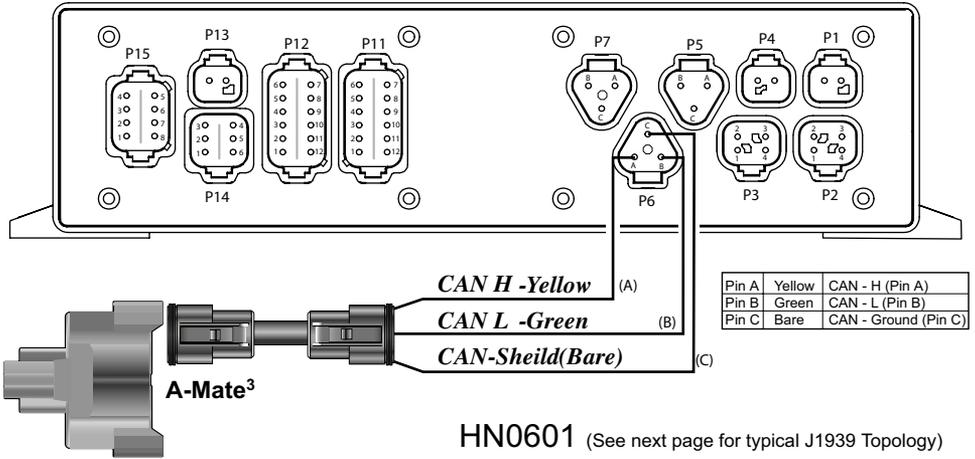


Figure 5

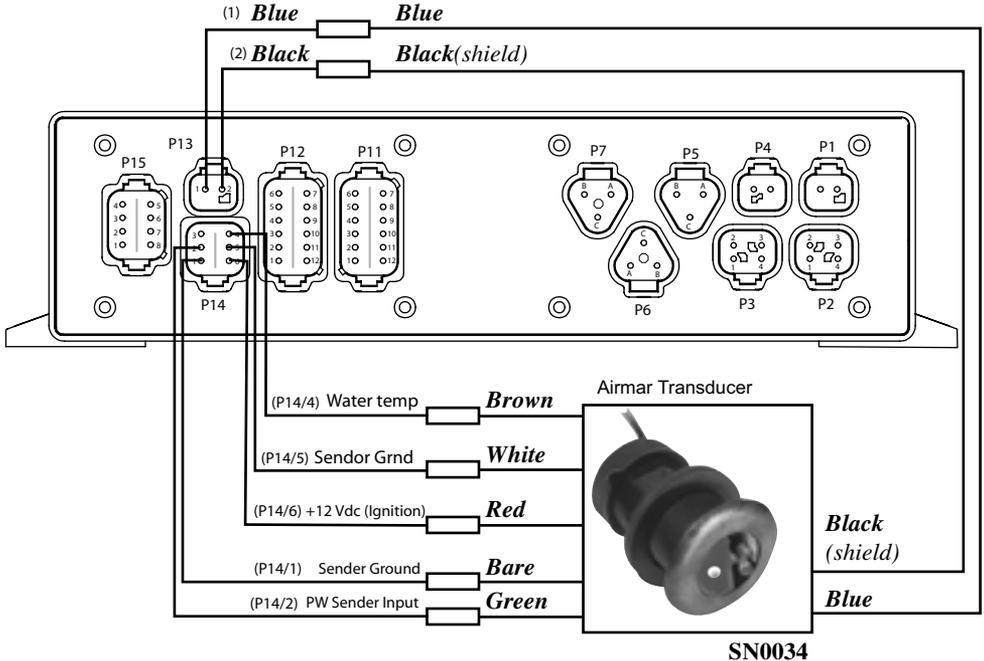
## Typical GM Engine ECU Connections



Y Connector<sup>2</sup>

Figure 6

## Transducer and Paddle Wheel Connections



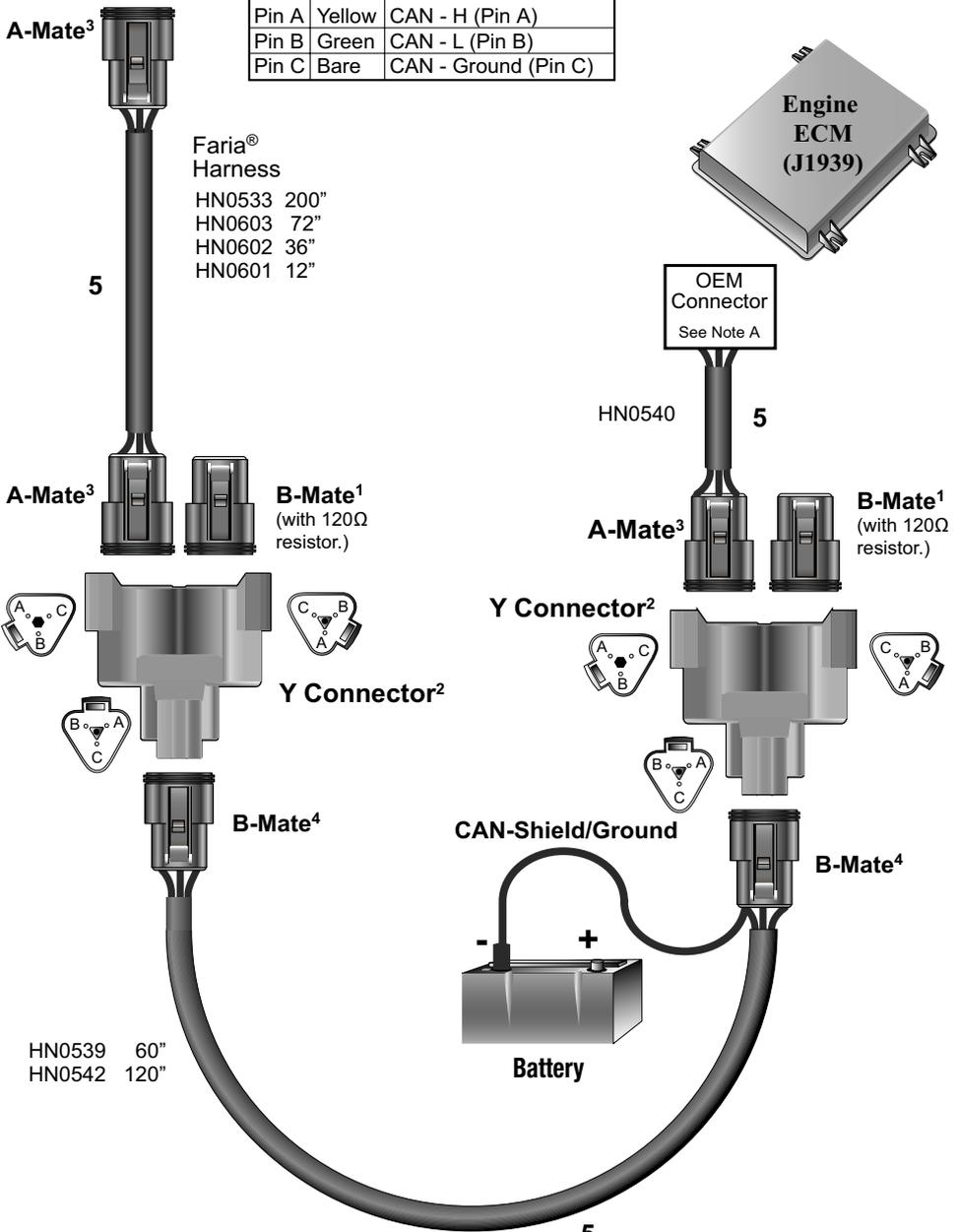
# Typical 2-device J1939 Network Topology



**IMPORTANT:** This diagram shows a correct example of a SAE CAN network topology. For more information, refer to SAE J1939-11. The Thomas G. Faria Corporation takes no responsibility for the information given. For a copy of SAE J1939-11 contact SAE directly. Tel: 724-776-4970, FAX: 724-776-0790, www.sae.org.

**CAUTION:** For proper operation of the Faria® system, the SAE topology must be followed.

## To Gateway P6

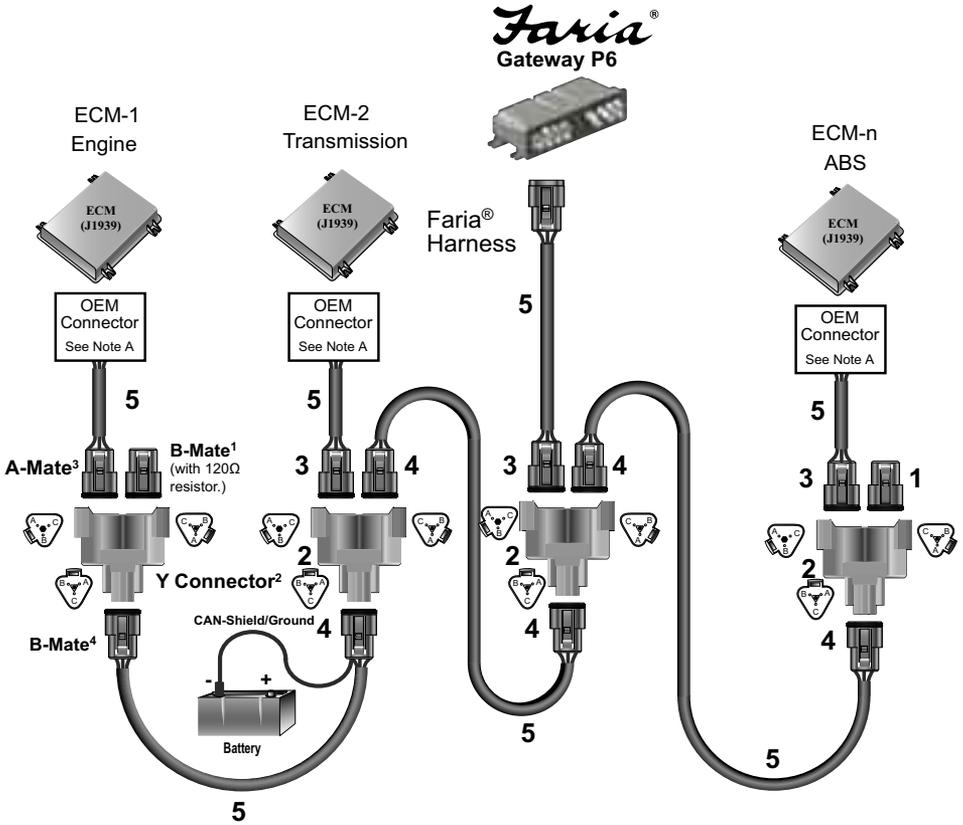


# Typical Multi-devices J1939 Network Topology



**IMPORTANT:** This diagram shows a correct example of a SAE CAN network topology. For more information, refer to SAE J1939-11. The Thomas G. Faria Corporation takes no responsibility for the information given. For a copy of SAE J1939-11 contact SAE directly.  
Tel: 724-776-4970, FAX: 724-776-0790, www.sae.org.

**CAUTION:** For proper operation of the Faria® system, the SAE topology must be followed.



Faria P/N					
1:	B-Mate w/120Ω	Plug with 120Ω resistor	Deutsch	DT06-3S-P006	CN0123
2:	Y Connector		Deutsch	DT04-3P-P007	CN0117
3:	A-Mate	3 Pin connector Wedge Lock 3 pins	Deutsch	DT06-3S-E008	CN0118
			Deutsch	W3S	CN0015
			Deutsch	1062-16-0144	CO0086
4:	B-Mate	3 Pin connector Wedge Lock 3 pins	Deutsch	DT06-3S-E008	CN0118
			Deutsch	W3S-1939	CN0086
			Deutsch	1062-16-0144	CO0086
5:	Impedance Controlled Shielded and Twisted J1939 Cable		Champlain Cable	SAEJ1939/1802SHBLK	WR0222

**Note A:** See engine manufacturer's specifications for proper connector information.

Figure 7

**Miscellaneous Connections**

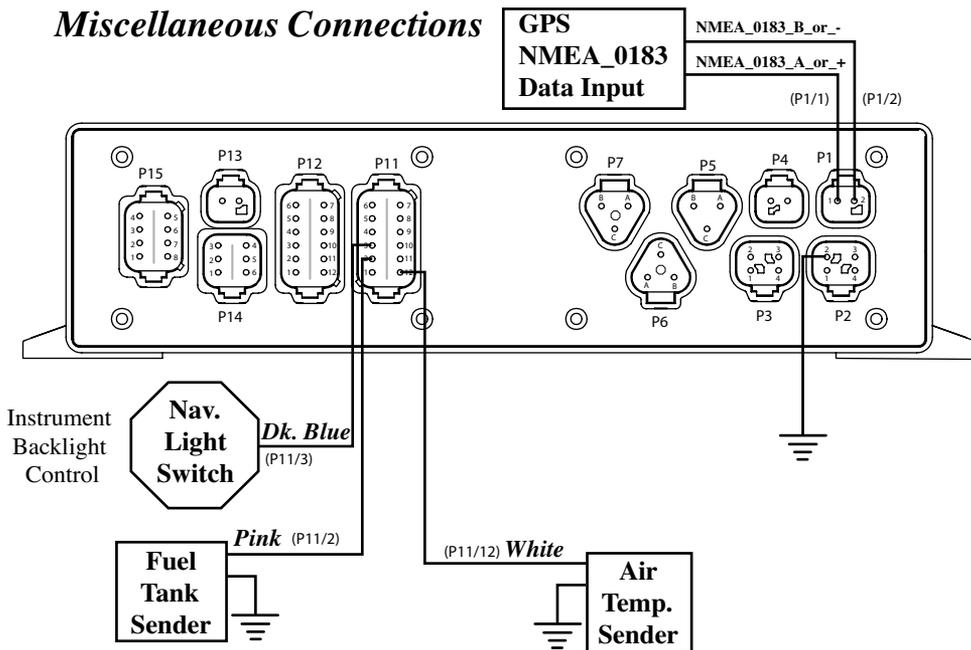
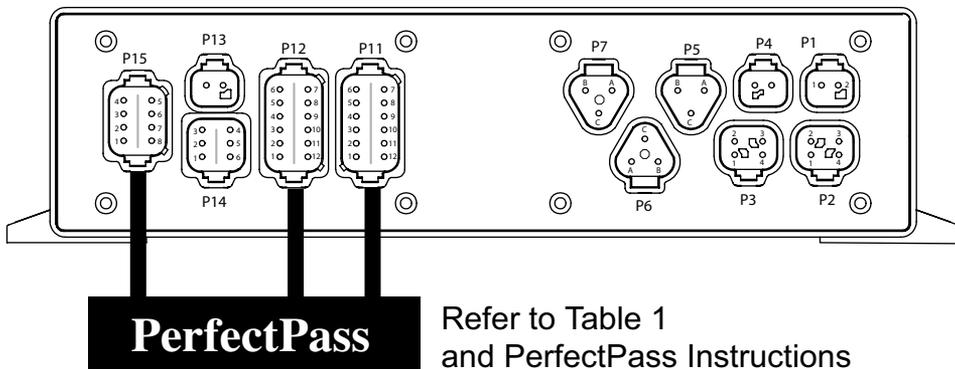


Figure 8

**PerfectPass Connections**



**Table1**

Connector	Contacts	Pin	Pin Function	Wire Color
P1	2	1	NMEA_0183_A_OR+	
		2	NMEA_0183_B_OR-	
P2	4	1	Battery Positive (5 amp. max. fuse req'd.)	Red
		2	Ground (Temp. Sender)	Black
		3	"Switched Power" from Ignition switch circuit	Purple
		4	Ground	Black
P3	4	All	Faria® Bus Data and Instrument Power	N/A
P4	2		Not Used	(PJ0015)
P5	3		Not Used	(PJ0016)
P6	3		J1939 CAN Bus	N/A
P7	3		Not Used	N/A
P8	N/A		Not Used	
P9	N/A		Not Used	
P10	N/A		Not Used	
P11 <b>Switch Inputs and PerfectPass</b>	12	1	Analog Input Ground	Pink Dk. Blue <b>Refer to PerfectPass Instructions</b>
		2	Fuel Sender Input	
		3	Navigation Lights Input	
		4	<b>PerfectPass Basic RPM IN</b>	
		5	<b>PerfectPass Isolated ground(used only for PerfectPass)</b>	
		6	<b>PerfectPass VGOV OUT</b>	
		7	<b>PerfectPass RQST</b>	
		8	<b>PerfectPass STAT IN</b>	
		9	<b>PerfectPass Throttle Position Signal</b>	
		10	Not Used	
		11	Not Used	
			12	
P12 <b>PerfectPass</b>	12	1	<b>PerfectPass +5 Volts</b>	<b>Refer to PerfectPass Instructions</b>
		2	<b>PerfectPass LCD +V</b>	
		3	<b>PerfectPass Isolated Ground</b>	
		4	<b>PerfectPass Display 9</b>	
		5	<b>PerfectPass Display 11</b>	
		6	<b>PerfectPass Display 3</b>	
		7	<b>PerfectPass Display 19</b>	
		8	<b>PerfectPass Display 5</b>	
		9	<b>PerfectPass Display 4</b>	
		10	<b>PerfectPass Display 12</b>	
		11	Not Used	
			12	
P13	2	1	Depth Sounder Transducer Signal (Airmar Transducer)	Blue
		2	Depth Sounder Transducer Ground, Sheild (Airmar Transducer)	Black
P14	6	1	Sender Ground	
		2	Paddle Wheel Sender Input	
		3	Not Used	
		4	Water Surface Temperature	
		5	Sender Ground	
		6	Paddle Wheel Power Out	
P15 <b>PerfectPass</b>	8	1	<b>PerfectPass Isolated Ground</b>	<b>Refer to PerfectPass Instructions</b>
		2	<b>PerfectPass 12 Volts</b>	
		3	<b>PerfectPass SLM Switch In</b>	
		4	<b>PerfectPass 12 Volts</b>	
		5	<b>PerfectPass Timer 1 In</b>	
		6	<b>PerfectPass Timer 2 In</b>	
		7	<b>PerfectPass Isolated Ground</b>	
		8	<b>PerfectPass 12 Volts</b>	

**Notes:**



6/27/06