Marine AccuTroll & CruiseMaster Gasoline
Inboard & I/O to 1000 HP, All Outboards

This manual (part # 4001-010-00) **applies to the following product part numbers**:

1) 5A20-20A-1
2) 5220-264-1M
3) 5232-231-1
4) 5232-231-1M
5) 5232-264-1
6) 53040-20B-1
7) 53040-264-1
8) 53080-231-1
9) 53080-231-2
10) 53080-264-1
11) 5310-264-2
12) 53100-231-1
13) 53100-33C-1
14) 53100-33C11
15) 53160-231-1
16) 53160-23121
17) 53160-264-1
18) 5320-20B-1
19) 5320-20B-2
20) 5320-231-1
21) 5320-264-1
22) 5320-264-2
23) 5332-20B-1
24) 5332-20B-2
25) 5332-231-1
26) 5332-231-2
27) 5332-264-1
28) 5332-264-2
29) 5350-231-11
30) 53080-20B-1
31) 53160-23111
32) 54020-20A-1
33) 54020-20A-2
34) 54040-20A-1
35) 54040-20A-2
36) 5405-20A-1
37) 5405-20A-2
38) 54080-20A-1
39) 54080-20A-2
40) 5410-20A-1
41) 5410-20A-2
42) 5420-20A-1

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43) 5420-20A-2
44) 55040-20B-1
45) 55040-231-1
46) 55040-231-2
47) 55040-264-1
48) 55040-264-2
49) 55080-20B-1
50) 55080-20B-2
51) 55080-231-1
52) 55080-231-2
53) 55080-264-1
54) 55080-264-2
55) 5510-20B-1
56) 5510-20B-2
57) 5510-201-2
58) 5510-231-1
59) 5510-264-1
60) 5510-264-2
61) 55100-231-1
62) 55100-231-2
63) 55160-20B-1
64) 55160-20B-2
65) 55160-231-1
66) 55160-231-2
67) 55160-23111
68) 55160-23121
69) 55160-264-1
70) 55160-264-2
71) 55161-231-1
72) 55161-231-2
73) 5520-20B-1
74) 5520-20B-2
75) 5520-231-1
76) 5520-231-2
77) 5520-264-1
78) 5520-264-1M
79) 5520-264-2M
80) 5520-264-2
81) 5532-20B-1
82) 5532-20B-2
83) 5532-231-1
84) 5532-231-1M
85) 5532-231-2
86) 5532-231-2M
87) 5532-231-11
88) 5532-231-21
89) 5532-264-1
90) 5532-264-2
91) 5550-231-1

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92) 5550-231-2
93) 5550-231-11
94) 5550-231-21
95) 56100-234-1
96) 56100-33C-1
97) 56100-33C-2
98) 56100-33C11
99) 56100-33C21
100) 56500-33C-1

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INSTALLATION PLANNING

READ ME FIRST - Mechanical & Electrical Installation Planning Saves Time!

FloScan systems are not difficult to install. Installing one requires only basic electrical & mechanical skills. With forethought and planning, your system will be installed with few problems.

I. Installation Preparation:

Review the mechanical installation instructions, then survey your vessel. Determine where the Sensor(s), Pulsation Damper(s), (if used) Switches and Instruments are to be mounted. Place them at their approximate locations. Measure fuel line lengths between system components, (Primary Filter, Sensor(s), Damper(s), Engine, and Fuel Tank). Determine fitting sizes and type of fittings needed for each plumbing connection, (JIC, SAE, NPT, NPTF, or Hose Barb).

FloScan Gasoline, "Hi-Flo" system components have ½" Female NPT ports.
FloScan Gasoline, "Lo-Flo" system components have ¼" Female NPT ports.

Review the electrical installation instructions. Open and survey your vessels wire ways and run 3-conductor cables from each sensor to the instrument. Tachometers require 1 or 2 additional conductors. If there's an existing tachometer, its signal wires can be used.

II. Mechanical Installation:

Install or mount the Sensor(s), Pulsation Damper(s), (If required) Instruments and Switches, (Reset, MPG, Port/Starboard, Synch).

III. Plumbing:

Mount sensor(s) where they're to be installed. On installations using **Fabric Braid A-1 Fuel Hose** install the correct HB X MNPT fitting into each sensor. Always assemble fittings using a fuel proof pipe thread sealant. **Never use Teflon Tape**. Use a hose cutter or knife to cut the fuel hose. Next install the hose onto the barb fittings. Hose should not be twisted, have adequate slack, an ample radius at all bends and be supported at reasonable distances, approximately 2-4 feet. When clamping hose onto the barbs, use 2 narrow or 1 wide stainless hose clamp on each hose end.

Wire Braid A-1 Aeroquip Type Fuel Hose or Hydraulic Hose: Mount the sensor(s) or sensor assemblies where they're to be installed. Mark the hose where it is to be cut. Remove hose and bring it to a hydraulic shop. Have them cut the hose and install hose ends. Reinstall the hoses and install the correct fitting into each sensor or sensor assembly. Always assemble fittings using a fuel proof pipe thread sealant. **Never use Teflon Tape**. Hoses should not be twisted, have adequate slack, an ample radius at all bends and be adequately supported at reasonable distances, approximately 2-4 feet. AP-50 copper sealing washers, (Connie Seals) or Flaretite seals may be required to seal JIC & SAE fittings.

IV. Electrical Installation:

Run cables between Sensor(s) and Instrument(s). Cables must be adequately supported at reasonable distances, approximately 2-4 feet. Wire Terminations—Referring to the wiring diagram. Connect Sensor, Instrument and Switches to their respective wires with crimp type butt or ring connectors. Always cover connectors and wire ends with heat shrink tubing.

V. System Start-Up:

Prime the fuel system and check for leaks. Start and run your engines. Look for leaks and other installation problems. If system is not operating properly refer to the Troubleshooting Instructions and correct any deficiencies.

VI. Calibration:

When system is running properly, refer to the calibration instructions and calibrate your system.

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USCG approved fuel hose with either fabric or wire reinforcing braid meet the following standards:

Hose Marking	Permeation Rating	2½ Minute Fire Test
USCG Type A-1	**100g/m²/24hrs.**	**Required**
USCG Type A-2	**300g/m²/24hrs.**	**Required**
USCG Type B-1	**100g/m²/24hrs.**	**Not Required**
USCG Type B-2	**300g/m²/24hrs.**	**Not Required**

Table I

Installation Do's & Don'ts

Do	Don't
Use a Fuel Proof Pipe Thread Sealant when assembling fittings into fuel system components, (Locktite PST, Leak-Lock, or equivalent).	**Never use Teflon Tape!**
Use thin wall, low pressure, full flow type NPT or NPTF hose barb fittings.	**Don't use Push-Lok, or Barb-Tite fittings.** Avoid using JIC or SAE swivel fittings. **If used always install copper conical sealing washers, (Connie seals) or fitting seals on fittings.**
Double clamp all hose barb fittings.	Avoid using 90º elbow fittings.
Install Sensor(s) at a low point in the fuel system, as far from the engine as practical. Fuel must travel, "Up-hill" slightly after leaving the sensor. Verify correct orientation and fuel flow direction.	**If possible, avoid bolting or mounting sensor(s) directly onto the engine.**
Connect all, "Ground" wires to a Ground Buss, or directly to the Battery's Negative Terminal. Connect or, "Ground" wire shields to the engine block.	**Never connect Instrument or Sensor "Ground" wires to the hull, engine block, or other machinery.**
On Instruments with a GPS interface, connect FloScan's Data (+) to the GPS signal output. Connect Data (–) to the GPS signal ground.	**Do not connect FloScan's Data (–) to the GPS Data (–).**
Always use non-illuminated switches for Totalizer Reset, Port/Starboard Select, Hours/Synch, and GPH/MPG.	**Never use illuminated, or back-lit switches.**

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Series 5400(0)/ 5500(0)/ 56100/ 7000(0)/8000(0)/ 9000(0), Single Sensor EFI 8A00(0)/9A00(0) and TwinScan® GPH Instruments for Gasoline Inboard/ I/O/ and Outboard Engines

FLOW SENSOR INSTALLATION

Flow Sensors must be placed in a horizontal section of fuel line at a low point in the fuel system. Fuel should travel, "Up-hill" when exiting the sensor. Its outlet should be at least 1 or 2 inches lower than the fuel pump inlet, priming bulb or pulsation damper, (if used). Pulsation Dampers and Priming Bulbs must also be mounted horizontally. Installing sensor(s) 12" upstream of the fuel pump, priming bulb or pulsation damper improves system accuracy. Install sensors in a protected location, away from water spray.

Model 20A, 20B, 231, & 233C gasoline sensors must be installed downstream of a fuel filter or water separator. On vessels not equipped with off engine filters, we suggest installing a Flow Ezy model ILA-02 filter with 238 micron screen directly to the 20A, 20B or 231 Low-Flow Sensors' inlet. Use model 4ILA-04 with 595 micron screens with High Flow 233C Sensors'.

Flow Ezy can be reached at (800) 237-1165.

Caution: NEVER install sensor(s) downstream of an engine mounted fuel filter. NEVER use Teflon Tape when installing sensors. Teflon Tape can jam a sensor's rotor. Instead, always use a fuel proof pipe thread sealant.

For proper system operation, Carburetor Inboard & I/O Engines having diaphragm fuel pumps require Gasoline Pulsation Dampers. FloScan Systems are not shipped with Pulsation Dampers' as carburetor Inboard and I/O engines are no longer in production. If you have a Carburetor Inboard or I/O engine, Pulsation Dampers can be purchased factory direct. Standard Flow Dampers' are $30.00 each. The standard Flow Damper can be ordered under Part Number 150-004-00 online at www.floscan.com in the Accessories section.

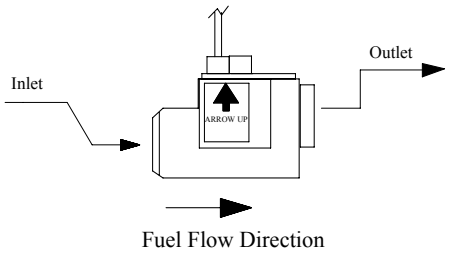
E-mail: sales@floscan.com, or service@floscan.com.

The following engine types DO NOT require Pulsation Dampers:

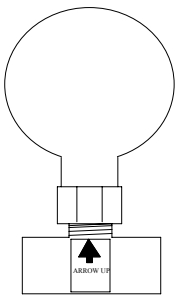
- **Outboard Gasoline Engines Including Ficht, Optimax, 2 & 4-Cycle.**
- **Most Closed Loop EFI Gasoline Inboard, and I/O Engines.**

- Sensors are marked with orientation and fuel flow arrows. They must be installed with these arrows pointing in the right direction.

20A/ 20B/ 231 SENSOR



Standard-Flow Pulsation Damper



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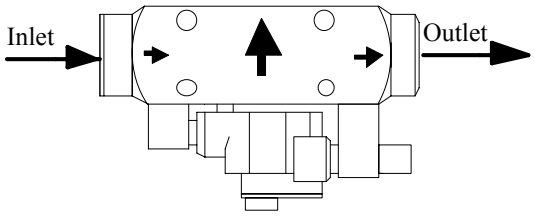
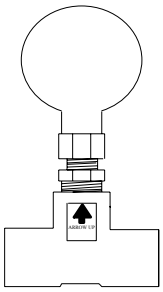
High-Flow Pulsation Damper

233C SENSOR





- Install sensor(s) with orientation arrows pointing UP ↑. Fuel must enter through the port marked IN or with an inward pointing ➔ fuel flow arrow, and exit through the port marked OUT or with an outward pointing ➔ arrow.

- The sensor must be installed horizontally at a low point in the fuel system. When fuel exits the sensor it must travel up-hill slightly. One or two inches of vertical rise is adequate, more is ok.

- The sensor must be installed downstream of, and protected by a screen, filter, or water separator. Sensors are tolerant of fine debris. A coarse screen, (up to 800 microns) or water separator is all that is required.

- It is recommended that the sensor be installed between the fuel filter and fuel pump inlet. There should be at least twelve inches of fuel hose, (more is ok) between the sensor and fuel pump inlet.

- If required, the pulsation damper must be installed horizontally, with its orientation arrow pointing up, (refer to fuel flow schematics below).

- **Minimize the number of 90º elbows and pipe fittings.** Excessive use may create a high vacuum, fuel restricting pressure drop across the fuel system. Whenever possible, use a large radius hose bend instead of elbows. Refer to the engine owner's manual for maximum fuel pump vacuum. A vacuum gauge can be used to confirm that the system is within limits.

- If swivel fittings are used, (JIC or SAE) their mating surfaces should be sealed with AP 50 Copper Conical Sealing Washers or Flaretite Fitting Seals. Seals and sealing washers can be purchased through Fittings Inc. in Seattle, WA (206) 767-4670, 1-800-552-0632, or a local hydraulic supply house.

CAUTION, DO NOT OVER TIGHTEN FLOW SENSOR FITTINGS. Over-tightening may crack the sensor's body. Cracks cause leaks and fuel leaks sometimes cause catastrophic explosions and fire. Assemble fittings with a Lubricating, Fuel Proof, Non or Semi Hardening pipe thread sealant, designed for aluminum and stainless steel threads, (Loctite 567 or equivalent).

DO NOT USE TEFLON TAPE.

INSTRUMENT INSTALLATION

- Before cutting holes in your Instrument Panel, verify that the instrument will be installed approximately 12" away from the compass, and in a shaded location out of direct sunlight. Mounting it within 12" of a compass may interfere with compass operation. Direct sunlight may cause the LCD display to temporarily turn black due to heat.

Instrument Series	Cutout Size	Instrument Depth
5400(0), 5500(0)	3 1/16"	3" – Console Panel Thickness
7000(0), 8000(0), 9000(0), TwinScan®	3 3/8"	2 ½" – Console Panel Thickness

Table 1

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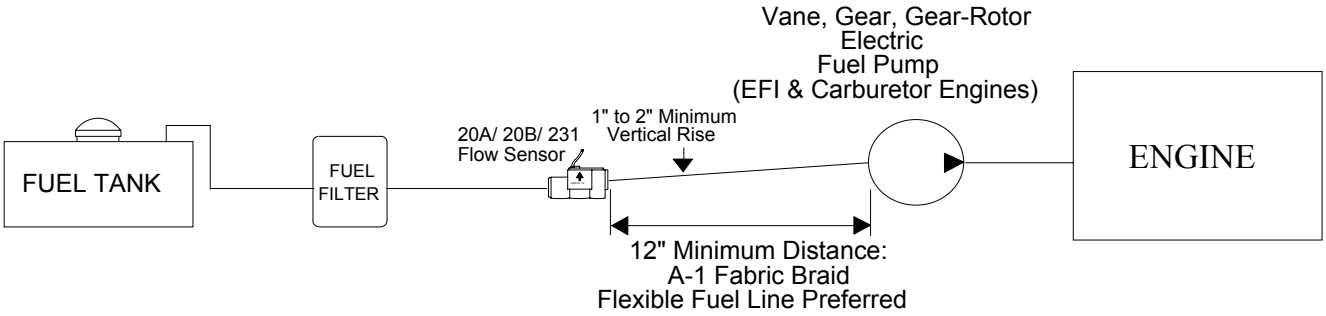
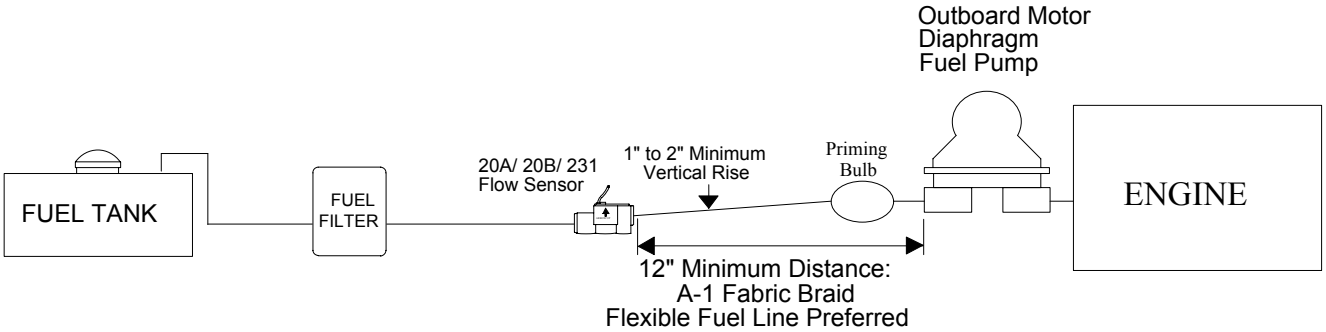
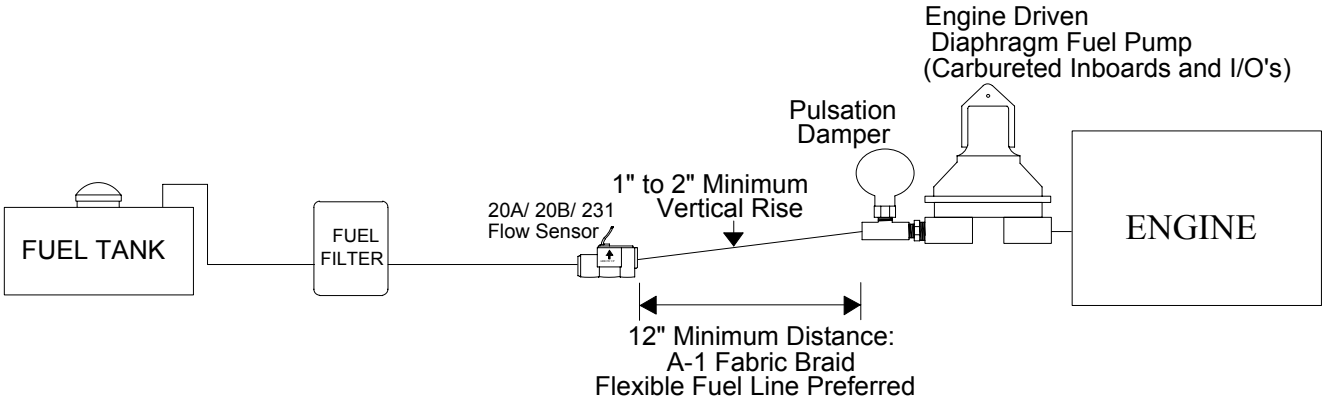
Standard-Flow Gasoline System Schematics







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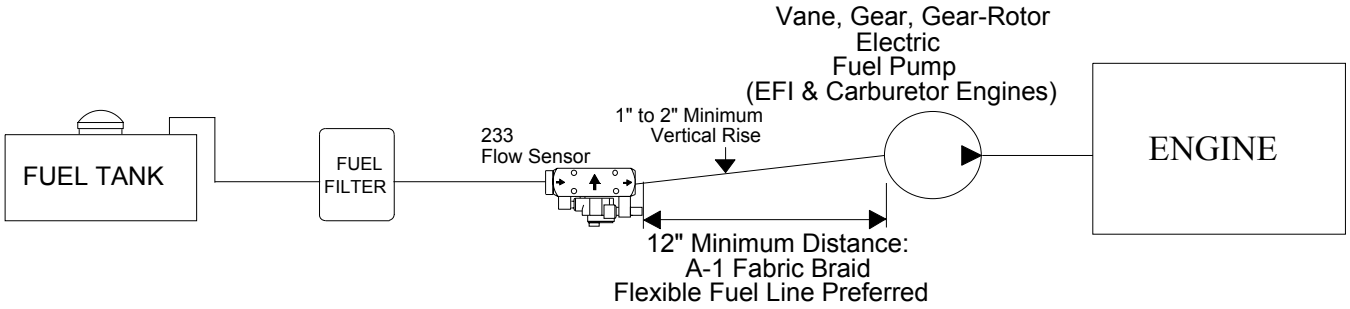
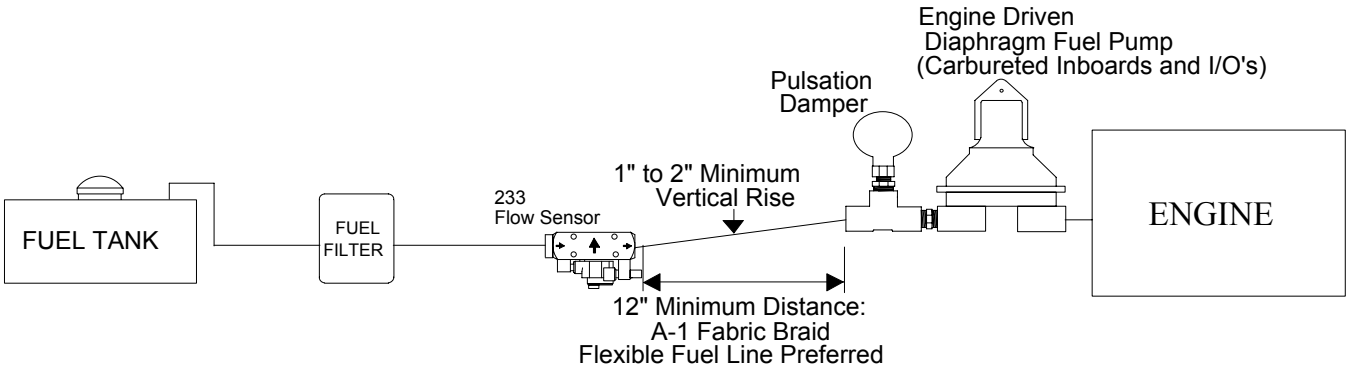
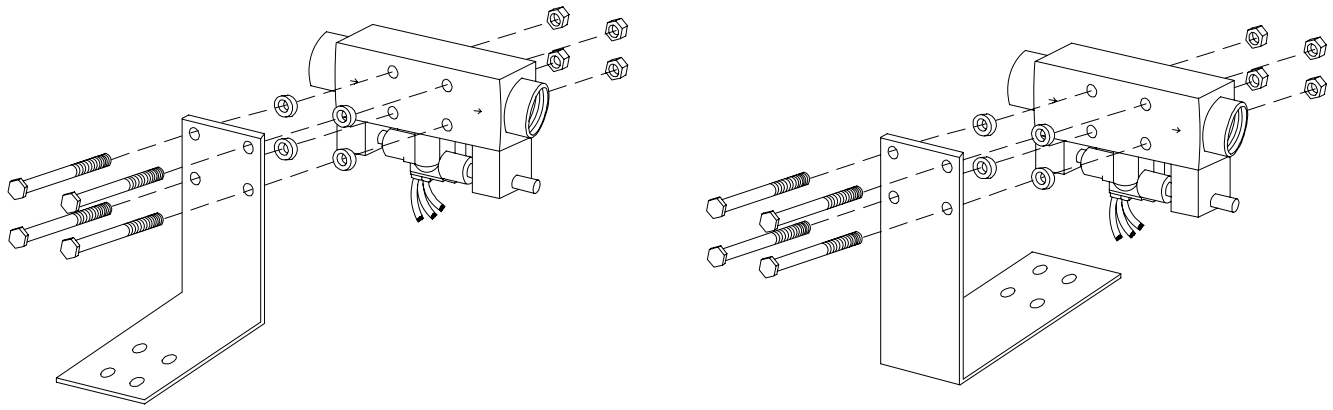
High-Flow Gasoline Fuel Flow Schematics







High-Flow Sensor Bracket Assembly

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Series 5400(0)/5500(0)/56100/5800(0)/6500(0)/6600(0) AccuTroll & CruiseMaster, All Multi Function Instruments, & TwinScan®

SET UP

Wire & Switches: Use 18 AWG stranded wire on runs under 50'. For runs over 50' use 16 AWG. Shielded wire is recommended for all Diesel systems and suggested for Inboard & I/O gasoline systems. Always, "Ground" the wire shield or shield drain wires in the engine room by connecting them to the bonding system or engine block. The double wiring harness for twin engine Pulse/NMEA Diesel installations is included in all, (97/9800(0)) kits. FloScan suggests using J-Boxes, Terminal Blocks, and three conductor cables between diesel sensors and instrument to make wiring easier.

Install Single Pole Single Throw (SPST) switches for Totalizer Reset, Port–Starboard Select, Engine Hours / Synchronizer, and GPH / MPG, (switches are not included with kit). To determine which switch types are required for your system, refer to the table below. All instruments except TwinScan Tachometers require a totalizer reset switch.

SYSTEM	TOTALIZER RESET	PORT/STBD Twin Engine Systems	HOURS/ SYNCH	GPH/ MPG	MPG/ SYNCH
5400(0)	SPST or Momentary OFF	SPST	NA	NA	NA
5500(0)/56100	SPST or Momentary OFF	SPST	NA	NA	NA
5800(0)	SPST or Momentary OFF	NA	NA	NA	NA
6500(0)/6600(0)	SPST or Momentary OFF	NA	NA	NA	NA
65/6600(0) Cummins PT	SPST or Momentary OFF	SPST	NA	NA	NA
7000/8000(0) Gasoline MFI	SPST or Momentary ON	SPST	SPST	NA	NA
71/8A00(0) MFI - Gasoline EFI	SPST or Momentary ON	NA	NA	NA	NA
75/7600(0) Diesel MFI	SPST or Momentary ON	NA	NA	NA	NA
9000 Gasoline MFI	SPST or Momentary ON	SPST	SPST	SPST	NA
9A00(0) MFI - Gasoline EFI	SPST or Momentary ON	NA	NA	SPST	NA
95/96/97/9800(0)	SPST or Momentary ON	NA	NA	SPST	NA
TwinScan GPH Meter	SPST or Momentary ON	NA	NA	NA	NA
TwinScan Tachometer	NA	NA	NA	NA	NA
TwinScan GPH & Tachometer	SPST or Momentary ON	NA	NA	NA	SPST

NA = Not Applicable

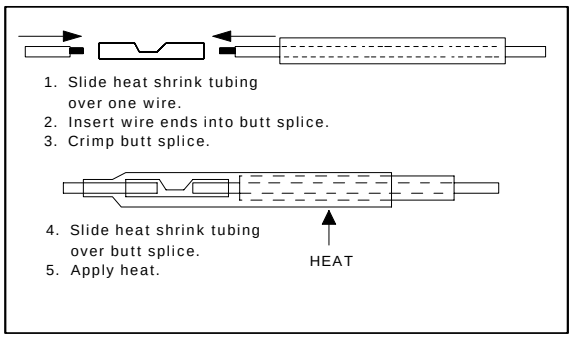
Grounding: Each Black sensor wire must be connected directly to the Black, "Instrument Ground" wire. Use a single wire to connect the Black wire junction to the battery's negative terminal, or a ground buss.

Power: FloScan Instruments & sensors operate on 9 to 12 VDC. Voltages exceeding 16 VDC will damage equipment. 24 & 32 VDC systems must be reduced to 12 VDC. Two different types of voltage reducers are available through FloScan.

WIRE CONNECTIONS

Installation: Connect wires one at a time and install heat shrink tubing before proceeding to the next wire, (refer to diagram). Connect ground wires first, (BLACK instrument ground wire to the BLACK sensor wires). Connect this junction to the battery's negative terminal or the ground buss. Connect all other wires leaving the Red power wires for last to prevent short circuits during installation.

Splicing: Splice or join individual wires per the diagram. Slide heat shrink tubing over the splices to prevent shorts. Do not seal splices until the installation is finished and has been tested.



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An adequate number of crimp-on connectors and heat-shrink tubing are included with system. The heat-shrink is a special type that will bond to wire insulation and make a watertight connection. See diagram for proper tubing application. Crimp-on connectors are sized for 18 or 20 gauge stranded wire.

Tachometer Wiring Information applies only to MFI & TwinScan Instrument Tachometers

Tachometer signal wires on MFI & TwinScan Tachometers should be shielded.

For proper tachometer operation on gasoline EFI engines, (especially outboards) the engine Ground wire must be physically connected to the MFI or TwinScan instrument ground wire.

Note: FloScan recommends using dedicated 18 AWG shielded cable for tachometer signal wire connections. Always, "Ground" wire shields or the shield drain wire in the engine room by connecting to the bonding system or engine block.

MULTI FUNCTION & TWINSCAN INSTRUMENT TACHOMETERS for CARBURETOR & CLOSED LOOP EFI GASOLINE ENGINES POINTS or STANDARD ELECTRONIC IGNITIONS

Inboard, & I/O Engines: Connect the YELLOW wire from pin # 8 to the distributor coil's negative terminal. On twin engine systems the Yellow wire from pin # 8 connects to the port engine, the VIOLET wire from pin # 16 to starboard.

Outboard Engines: Outboard tachometers are connected to either the engine alternator or tachometer signal wire. Connect the YELLOW wire from pin # 8 to the engine alternator or tachometer signal wire. On twin engine systems the Yellow wire from pin # 8 connects to the port engine, the VIOLET wire from pin # 16 to starboard.

MULTI FUNCTION & TWINSCAN INSTRUMENT TACHOMETERS for
CLOSED LOOP EFI GASOLINE ENGINES with CPU IGNITION SYSTEMS
Inboard, I/O, & Outboard Engines: Connect the YELLOW wire from pin # 8 to the engines' tachometer signal wire. On twin engine systems the Yellow wire from pin # 8 connects to the port engine, the VIOLET wire from pin # 16 to starboard.

Outboard Engines: Connect the YELLOW wire from pin # 8 to the engines' tachometer signal wire. On twin engine systems the Yellow wire from pin # 8 connects to the port engine, the VIOLET wire from pin # 16 to starboard.

MULTI FUNCTION INSTRUMENT TACHOMETERS for
OPEN RETURN EFI GASOLINE ENGINES with CPU IGNITION SYSTEMS
Inboard & I/O Engines: Connect the YELLOW wire, pin # 8 to the engines' tachometer signal wire.

MULTI FUNCITON INSTRUMENT TACHOMETERS - DIESEL ENGINES

- Keep existing tachometer: Connect the YELLOW and VIOLET wires to the existing tachometer signal wires. If one lead is grounded at the pickup or alternator, connect the YELLOW wire to the tachometer signal wire. Connect the VIOLET wire to a ground buss.

- Replace existing tachometer: Connect the YELLOW and VIOLET wires to the existing magnetic pickup or signal generator. If one lead is grounded at the pickup or alternator, connect the YELLOW wire to the existing signal wire terminal at the tachometer and connect the VIOLET wire to a ground buss.

- Install as a new tachometer. On engine alternator installations, connect the YELLOW wire to the tachometer output terminal (usually marked "tach" or "sig") and connect the VIOLET wire to a ground buss. For mechanically driven A-C signal generators and magnetic pickups, connect the YELLOW wire to one terminal and the VIOLET wire to the other.

TWINSCAN INSTRUMENT TACHOMETERS – DIESEL ENGINES

- Connect the YELLOW wire to one terminal the Port tachometer sender, (AC signal generator, Magnetic pickup, or the engines' alternators tach or sig terminal). Connect the VIOLET wire to the Starboard sender. The tachometer senders' second terminal must be grounded.

FINAL ACTIONS

Check Electrical Installation: Test all connections. Support and secure all dangling wires. Start engine and calibrate system.

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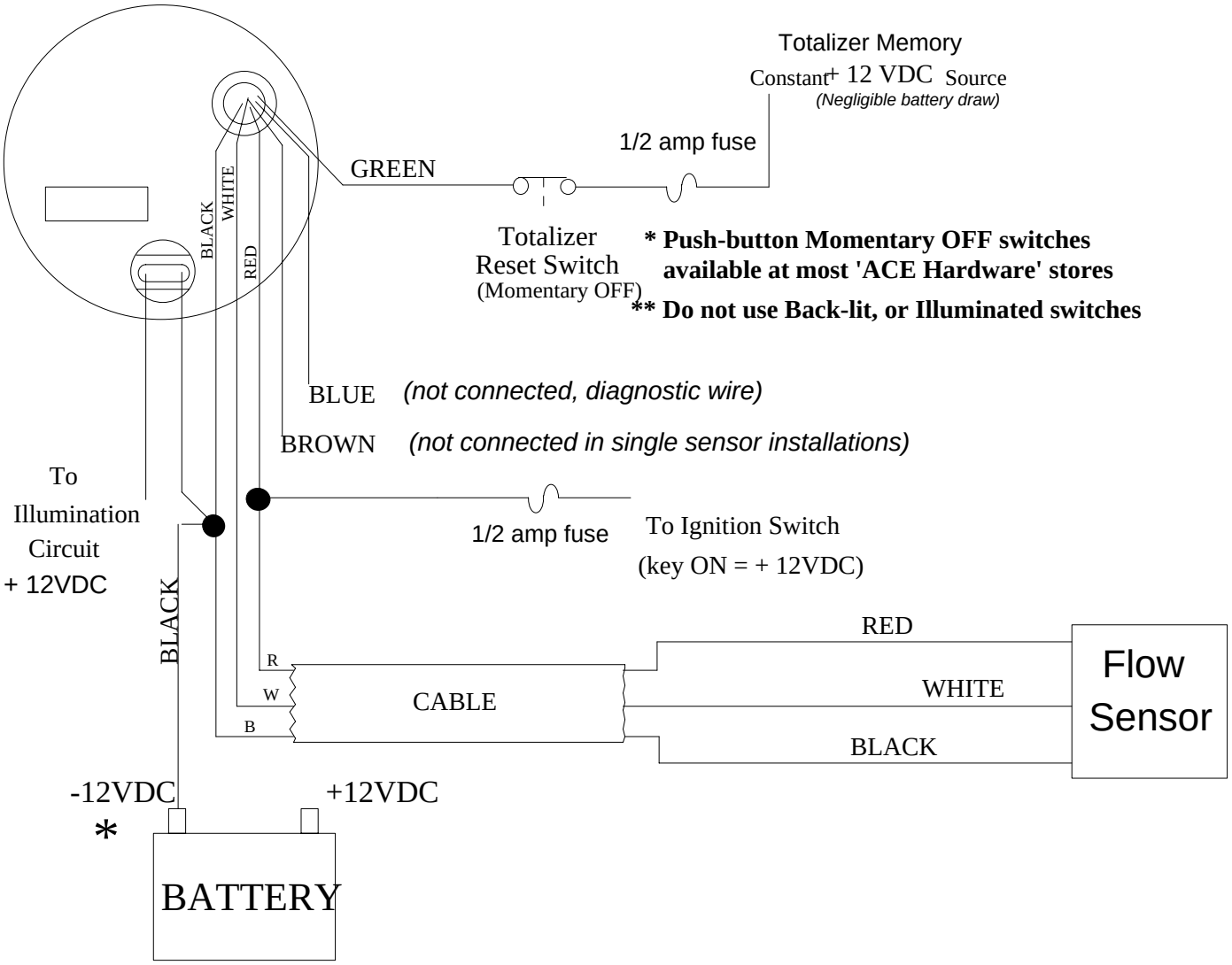
WIRING DIAGRAM

Series 5400(0)/5500(0)/56100 AccuTroll & CruiseMaster
GPH Instrument with LCD Totalizer

WIRING LEGEND

WIRE COLOR	FUNCTION
RED	Ignition + 12VDC.
GREEN	Totalizer Memory, Constant + 12VDC
BLACK	Battery Minus **(–)** or Minus Buss *
BLUE	PORT/STARBOARD Select Switch.
WHITE	PORT Flow Sensor.
BROWN	STARBOARD Flow Sensor.

Single Sensor Installation



* Ground refers to earth potential and is established by a conducting connection through a conducting part of the wetted hull, shaft or propeller. Battery Minus is called, "Ground" only when it's electrically connected to, "Earth".

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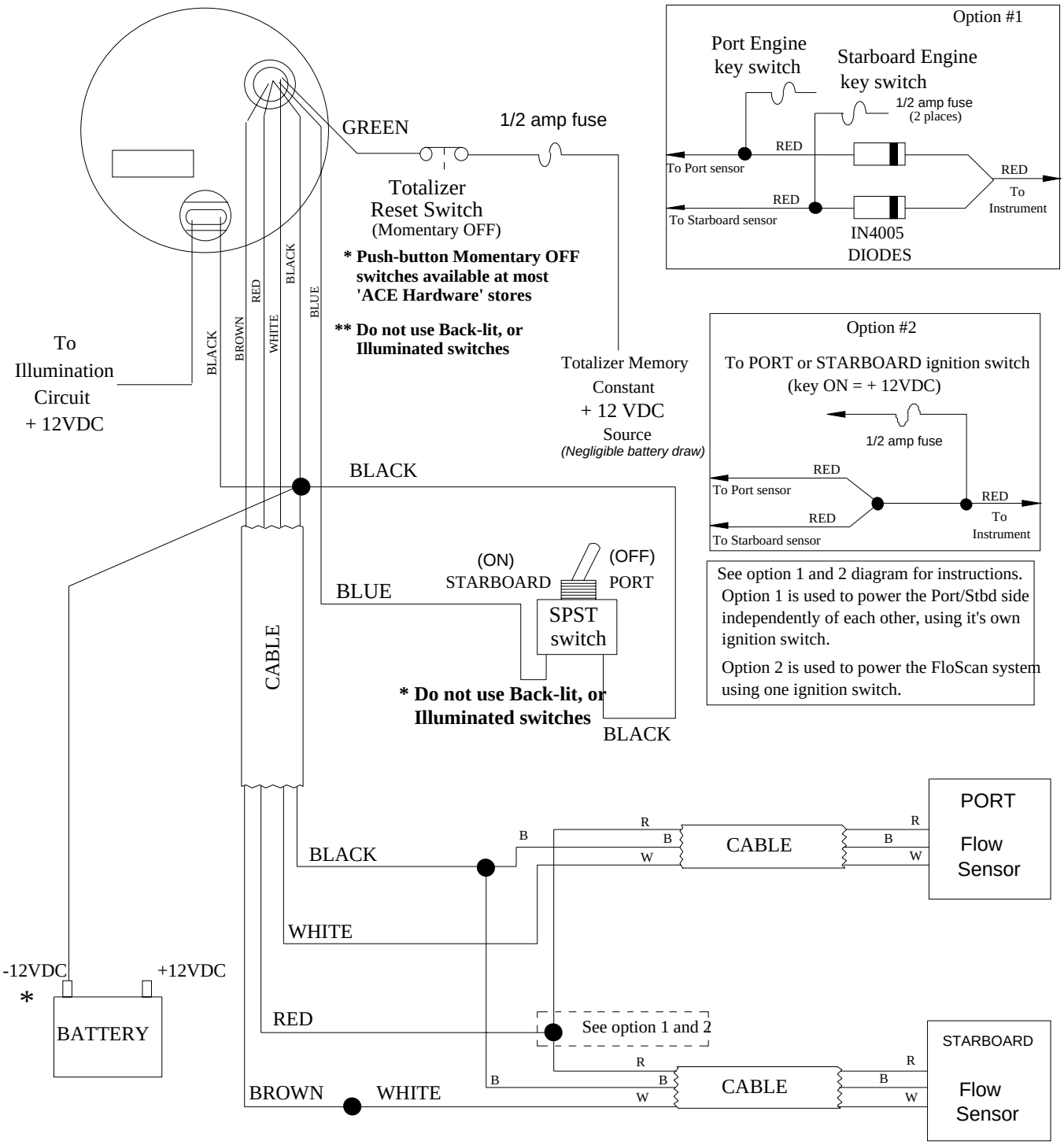
Twin Engine Installations



* Ground refers to earth potential and is established by a conducting connection through a conducting part of the wetted hull, shaft or propeller. Battery Minus is called, "Ground" only when it's electrically connected to, "Earth".

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Series 5400(0)/5500(0)/56100 AccuTroll & CruiseMaster

There are nine, "Dip" switches on the back of your 5400(0)/5500(0)/56100 Series Instrument. Switches 1-4 are used for instrument calibration (Refer to Table I). Switches 6 - 9 select the flow sensor required by your engine, (Refer to Table II) Switch 5 is used to dampen the instrument needle in heavy seas. When turned on, switch 5 slows the needles' response rate.

Totalizer Calibration:

1. Top off the fuel tank(s) and reset the totalizer to, "0".
2. Operate the boat the way that you normally would, consuming at least 20 gallons of fuel.
3. Return to the fuel dock and top off your fuel tank(s).
4. Compare the totalizer reading to the fuel pump reading.
5. Calculate the percentage difference using the following formula:

$$\frac{\text{Difference in Gallons}}{\text{Totalizer Reading}} \times 100$$

6. Turn ON the combination of switches 1, 2 and/or 3 which equal that difference.

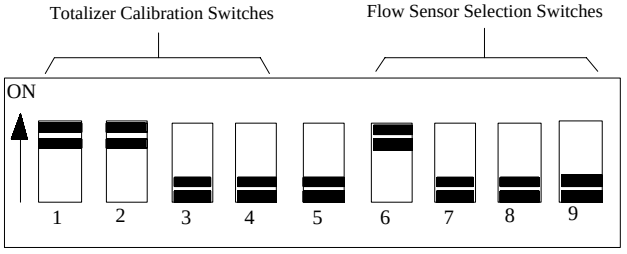
Example:

You determine the totalizer reading is 6.5% lower than what actually was actually used. The combined percentage total of switches 1 (2%) and 2 (4%) is 6%. Turn switches 1 and 2 and "4" ON.

Switch #4 remains OFF if the totalizer reads higher than the actual fuel used, and is turned ON if the totalizer reading is less than the fuel used.

Switch position	***results when turned on***
(1)	2%
(2)	4%
(3)	8%
(4)	*OFF* Totalizer reading higher *ON* Totalizer reading lower
(5)	*OFF* Normal meter damping *ON* Heavy meter damping

Table I



EXAMPLE: With switches 1 & 2 On, and 3 & 4 Off: The totalizer reading will decrease by 6%. This example shows a model 231 sensor selected (Switch 6 On, Switches 7-9 Off).

Sensor	***Switches***			
	(6)	(7)	(8)	(9)
* 20A	OFF	ON	OFF	OFF
20B	OFF	OFF	OFF	OFF
231	ON	OFF	OFF	OFF
233C	ON	ON	OFF	OFF

Table II

***** Instruments programmed for the 20A sensor cannot be used with 20B, 231 or 233C sensors.

NOTE:

1. Adjusting instrument calibration affects both Totalizer and GPH readings.
2. Drastically changing operating habits (from mostly cruising to mostly trolling) may slightly affect totalizer accuracy.
3. On custom calibration instruments, at least one of the switches from 1-5 must be OFF. If switches 1-9 are all turned ON, the instrument automatically goes into diagnostic mode.

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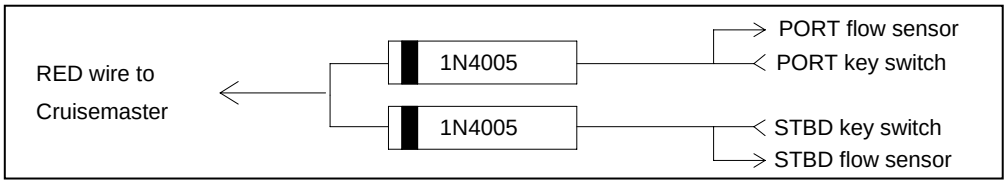
COMMON ACCUTROLL & CRUISEMASTER SYSTEM QUESTIONS

1. How is the 5400(0)/5500(0)//56100, twin engine system wired so that either engine will power the meter.

Use two diodes, (1N4005) and wire as per the sketch below.



2. What type of switch is used for the PORT/STBD select switch?

A single pole single throw (SPST) On/Off switch. When the switch is turned OFF, the needle shows the Port engine consumption. When turned on, the needle shows Starboard engine consumption.

3. How do I reset the totalizer?

Totalizer memory is powered through the Green wire. If Green wire power is interrupted for 10-15 seconds the totalizer resets to zero. Memory is retained as long as 9-15 VDC is maintained between the GREEN and BLACK meter wires.

4. Will, "Pegging" the GPH meter needle hurt the instrument? Will the totalizer record accurately with the needle pegged?

When "Pegged" the needle rests harmlessly against a mechanical stop while the totalizer continues to accurately record consumption.

5. What causes needle fluctuations?

Fluctuating readings are usually caused by one of the following:

- Air bubbles passing through the flow sensor.
- Fuel pump pulsations, (Do not install the flow sensor closer than 12" to the fuel pump).
- A Sticky or misadjusted carburetor float valve.
- A 4 sided, "square" float valve, (installing and properly adjusting a three, (3) sided triangular float valve corrects this problem).
- A sticking or chattering anti-siphon valve.

NOTE: Sticking float and anti-siphon valves do not affect system accuracy.

6. Does it make any difference which way the flow sensor(s) are mounted?

YES. There is only one way to install the sensors. Flow sensor(s) must be installed with the fuel flow and orientation arrows pointed in the right direction for the system to work properly.

7. Will the flow sensor cause fuel starvation?

No, the flow sensors will not cause fuel starvation. Anything put into a fuel line does however have a certain pressure drop across it. Everything in the fuel line combines to form the systems total pressure drop. If this is more than the fuel pump can tolerate, you must find a way to reduce the total pressure drop or fuel starvation will occur at higher engine RPM.

8. Will the flow sensor shut off fuel to the engine if it stops working?

FloScan flow sensors are of a FAIL SAFE design. A failure will not restrict fuel flow to the engine, nor will the sensors' pressure drop increase even if the rotor stops turning.

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9. Why isn't my totalizer as accurate as it could be?

The major causes of inaccurate totalizer readings are:

- Air bubbles in the fuel line caused by vacuum leaks around fuel filter gaskets, and/or improperly sealed plumbing joints.
- Incorrect flow sensor installation.
- Installing sensor within 12-14" of the fuel pump.
- Faulty wiring.
- Improper sensor selection and instrument calibration.

10. What do I do if I have a problem?

Most problems are related to improper installation. Step 1 is to review the installation and verify that system components are installed and wired correctly. Next follow the troubleshooting guide, and record your results. This will most likely lead you to the problem. If not please call FloScan Technical Support at (800 522-3610) with your test findings. If you did not complete the troubleshooting steps, you will be asked to do so before calling back.

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Series 5400(0)/5500(0)/56100 AccuTroll & CruiseMaster GPH/LPH Instrument

BEFORE CALLING FOR ASSISTANCE, COMPLETE THESE TROUBLESHOOTING CHECKS AND RECORD YOUR FINDINGS. TECHNICAL SUPPORT REQUIRES THIS INFORMATION BEFORE A RETURN AUTHORIZATION WILL BE ISSUED. IT TAKES ABOUT 20 MINUTES AND IS VERY IMPORTANT IN ANALYZING SYSTEM PROBLEMS.

Before starting record the Instrument MODEL # _____ and all Switch settings.

ON									
OFF									
Switch Settings	1	2	3	4	5	6	7	8	9

FAULT	*PROBABLE CAUSE*	*SEE SECTION:*
Blank LCD Display.	Wiring	Section I
No Back-Lighting.	Wiring/bulb failure	Section III
Low Totalizer Reading, more than 10%.	Calibration	Calibration sheet
	Sensor orientation/failure	Installation Sheet
High Totalizer Readings, more than 10%.	Incorrect/defective sensor	Operations
	Incorrect switch settings	Manual page
	Suction leak	Section VI
Fluctuating GPH readings.	Suction leak	Section VI
	Low RPM operation	Section VIII
No GPH or totalizer reading.	Wiring/Instrument failure	Section IV and V
	Sensor orientation/failure	Installation sheet
No sensor readings.	Wiring	Section IV and V
	Sensor failure	Section II
High sensor readings.	Suction leak	Section VI
	Wrong switch settings	Calibration sheet
	Sensor orientation	Section VII

I. INSTRUMENT HEAD DIAGNOSTIC TEST

1. Referring to the wiring diagram, verify that Instrument & Sensor(s) are wired correctly.

2. Verify that all wiring connections are tight and not corroded. Check continuity with an ohmmeter.

3. With power switched ON, measure voltage between the RED and BLACK wires,
   (Take readings on the **Instrument** side of the butt splice connections). _____VDC

   The voltage reading should be between 12 and 14.5 VDC. Proceed to step 4 if it is, if not:
   a. Check for voltage between the RED wire and another ground point.
   b. If voltage is present, trace along the BLACK wire until its' open connection is found.
   c. If no voltage is present, trace the RED wire until its' open connection is found.

4. With switched power ON slide, "Dip" switches 1-9 to the ON, or UP position. This places the Instrument into **diagnostic mode.**

NOTE: If the LCD display is blank, verify that the totalizer reset switch, (Connected between the GREEN wire and +12 volts) is in the ON position. Verify that 12 VDC is present between both switch terminals and the Black wire. Next check the, "Green wire" fuse.

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5. In, “Diagnostic Mode” the totalizer will count at 1 gallon or 1 liter per second. If it does not, the Instrument is defective.

6. With the BLUE wire floating, (Disconnected) on single engine systems, or the Port/Starboard select switch set to Port on twin engine systems, the pointer should read approximately:

5 GPH models	**4.5**	20 LPH models	**18**
10 GPH models	**9**	40 LPH models	**35**
20 GPH models	**18**	80 LPH models	**70**
32 GPH models	**28**	160 LPH models	**140**
50 GPH models	**45**	500 LPH models	**450**
100 GPH models	**90**		

7. With the BLUE wire connected to the Instruments’ BLACK wire on single engine systems, or the Port/Starboard select switch set to Starboard on twin engine systems, the pointer should read approximately:

5 GPH models	**0.25**	20 LPH models	**1**
10 GPH models	**0.5**	40 LPH models	**2**
20 GPH models	**1**	80 LPH models	**5**
32 GPH models	**2**	160 LPH models	**10**
50 GPH models	**2**	500 LPH models	**20**
100 GPH models	**5**		

NOTE: If readings are significantly Higher or Lower, the Instrument may be defective.

8. Turn switches 1, 2, 3, 4, 5, 8 and 9 OFF, leave 6 and 7 ON.

9. Disconnect the WHITE and BROWN wires at the Instrument. Connect a course thread, (½ - 13) or similar non-plated bolt to the BLACK wire.

10. With the BLUE wire floating, (Disconnected) or Port/Starboard select switch set to Port, vigorously run the WHITE wire up and down the bolt threads. This generates a pulse and should lift the needle off zero. The totalizer should also eventually start counting. Faster movements give higher readings.

11. With the BLUE wire connected to ground or the Port/Starboard select switch set to Starboard, vigorously run the BROWN wire up and down the threaded bolt as described above. This generates a pulse and should lift the needle off zero. The totalizer should also eventually start counting. Faster movements give higher readings.

12. If the Instrument passes steps 10 & 11, return switches 1-9 to their original position, and proceed with Part II. If not contact FloScan Technical Support.

NOTE: Occasionally a good Instrument will fail the, (Bolt Scratch Test).

II. TEST FLOW SENSOR(S)

1. With your voltmeter set to a DC scale greater than 14 volts, measure between the RED (+12VDC) and BLACK (Instrument ground) wires. With engine idling, measure and record the voltage reading. _____VDC

2. Move the voltmeters’ negative lead to the WHITE (Signal) wire. With engine idling, measure and record the voltage reading. Readings between 4 and 10 VDC, usually indicate a good sensor. _____VDC

3. Stop the engine while observing the voltmeter. Readings should fluctuate between a high of 9 to 12 VDC, and a low of 0 to 4 VDC as the sensors’ turbine slows to a stop. _____VDC

NOTE: This may not be seen on a digital voltmeter.

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4. Move the voltmeters' negative lead to the BROWN (Signal) wire. With engine idling, measure and record the voltage reading. Readings between 4 and 10 VDC, usually indicate a good sensor. _____VDC

5. Stop the engine and observe the voltmeter. Voltage readings should fluctuate between a high of 9 to 12 VDC, and a low of 0 to 4 VDC as the Sensors' turbine slows to a stop.

   NOTE: This may not be seen with a digital voltmeter.

6. The Sensor may be defective if voltage readings in steps 3 & 5 remain constant while the engine is stopping.

7. On twin engine systems, try swapping the Brown & White signal wires. Observe the Instrument and see if the problem shifts sides, or remains on the same side.

With this guide in hand, contact FloScan Technical Support.

III. BACKLIGHTING.

1. Referring to the wiring diagram, check back lighting bulb and Instrument illumination circuit.

IV. CHECK + 12 VDC and GROUND

1. Turn Instrument power ON, and go to the Instruments' backside.

2. Measure between the RED (Power) wire and the BLACK (Instrument ground) wire. _____VDC
   This reading should be approximately 12 VDC, but not lower than 10 VDC.

3. If 12 VDC is not present, measure between the RED power wire and a known good ground in the instrument panel. If you measure 12 to 14 VDC between the Red wire and ground, you may have _____VDC
   an instrument ground problem.

4. If 12 to 14 VDC is not present in steps 2 or 3, check wiring, switches, fuse, and the 12 VDC power source.

V. CONTINUITY TESTING

1. Continuity testing requires access to the back of the Instrument and an Ohmmeter. It verifies that wires are not broken, shorted to ground, another wire, or to power. Before starting, secure all power.

2. Disconnect the WHITE and BLACK wire harness conductors from the WHITE and BLACK Port Sensor wires. Connect a jumper from the WHITE wiring harness conductor to a known good ground. At the _____
   back of the Instrument, connect an Ohmmeter lead to its' WHITE wire. Connect the other Ohmmeter lead (Ohm Reading)
   to a known, good ground. The Ohmmeter should read approximately 0.1 to 3 Ω.

3. Disconnect the BROWN and BLACK wire harness conductors from the WHITE and BLACK Starboard Sensor _____
   wires. Connect a jumper from the BROWN wiring harness conductor to a known good ground. At the back of the (Ohm Reading)
   Instrument, connect an Ohmmeter lead to its' BROWN wire. Connect the other Ohmmeter lead to a known good ground. The Ohmmeter should read approximately 0.1 to 3 Ω.

VI. PULSATION PROBLEMS

A stiff anti-siphon valve, sticking carburetor float or miss-plumbed Pulsation Damper(s) can cause fluctuating GPH readings. These are most pronounced at low Rpm's and tend to disappear around mid throttle. They are annoying, but won't affect totalizer accuracy. To eliminate, repair or replace any defective parts, or re-plumb dampers according to the Fuel Flow Schematic Instructions.

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VII. FINDING FUEL SYSTEM VACUUM LEAKS

Fluctuating GPH and High Totalizer Readings are usually caused by a small vacuum leak between the fuel tank and fuel pump inlet. Fluctuations tend to be between 2 and 4 GPH. These vacuum leaks also affect totalizer accuracy, causing it to read 15 to 100% high. Larger leaks produce greater fluctuations and higher readings. They generally do not affect engine performance.

Finding suction leaks can be time-consuming. When approached properly, they can usually be found and repaired quickly. Two common places for suction leaks to occur are at the primary fuel filter - water separator, and/or a loose valve stem packing nut.

Remove the filter housing and coat all o-rings, gaskets and sealing surfaces with a medium to heavy grease, **(Do not use oil)** and reassemble. Grease all valve stem packing and gently tighten gland nuts. Don't over tighten, valve handles should turn freely. Tighten all hose clamps and compression fittings. Don't over tighten. Run the engine for 5 to 10 minutes observing GPH readings. If you've found the problem, fluctuations should be reduced to less than ½ GPH.

If the problem persists, temporarily install a clear piece of fuel resistant hose downstream of the forward flow sensor. Run the engine and watch for a stream of small bubbles in the clear hose, or an occasional larger bubble. Sometimes shining a light through the hose makes bubbles easier to see.

Observe the clear hose while shaking the fuel lines. If the bubble stream continually increases or decreases you've found the leak area. Repair or replace as needed. If this occurs one-time, you probably dislodged some trapped air.

If the leak hasn't been found, the last step is to inspect each pipe joint. Thread sealant should be visible around each joint. If not, that joint is suspect and must be resealed. After resealing run the engine for a few minutes to purge any remaining air. There should now be bubble free fuel running through the clear hose. If bubbles are still present a leak was missed. Recheck your work. After all the leaks are stopped, remove the clear hose.

VIII. FUEL FILTERS

A dirty fuel filter, or one that is too fine (1-25 micron) will draw vapor bubbles out of the fuel, causing fluctuations and high readings. Replace it with a new 30-micron or coarser filter.

IX. FLOW SENSOR ORIENTATION

Sensor orientation is critical for proper operation. All Sensors have their inlet and outlet ports clearly marked (**IN / OUT** or ➔ ➔). This identifies fuel flow direction. The Sensor must be, "Plumbed" correctly for it to operate properly. There is an additional single arrow on the Sensor body. It is crucial that this single arrow points up ↑.

X. LOW RPM OPERATION

At idle, under a no load condition, it is common for GPH readings to fluctuate slightly. These fluctuations are caused by the engine governor regulating fuel flow to maintain a steady engine RPM.

This concludes Instrument and Sensor testing. If problems persist, contact FloScan Technical Support.

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