

MULTIFUNCTION GAUGE

SERVICE TOOLS

Description	Part Number	Page
FLUKE 115 MULTIMETER	529 035 868	8–9

SERVICE PRODUCTS

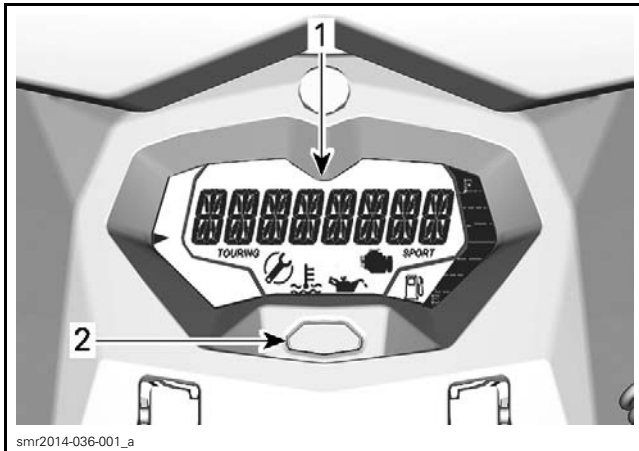
Description	Part Number	Page
DIELECTRIC GREASE	293 550 004	5, 12

GENERAL

MULTIFUNCTION GAUGE

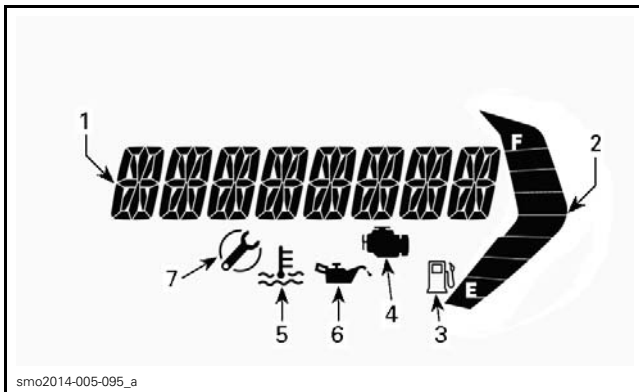
WARNING

Do not adjust the display while riding, you could lose control.



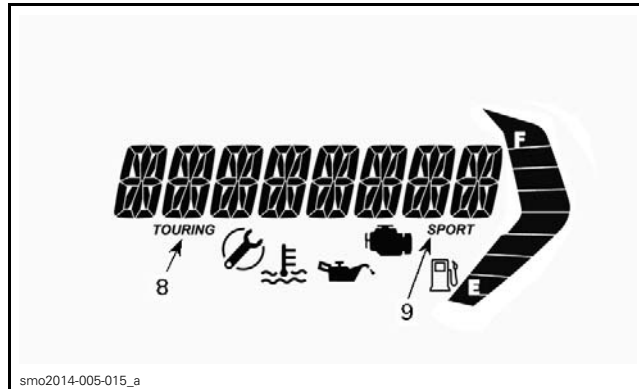
- 1. Multifunction gauge
- 2. Mode button

Multifunction Gauge Description



- 1. Multifunction display
- 2. Fuel level indication
- 3. Low fuel level indicator
- 4. Check engine light
- 5. High temperature indicator
- 6. Low oil pressure indicator
- 7. Maintenance reminder indicator

Rotax ACE 900 HO

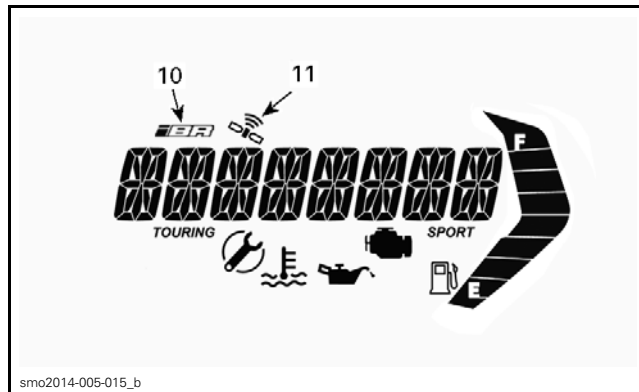


smo2014-005-015_a

TYPICAL

- 8. Touring mode indicator
- 9. Sport mode indicator

Models with iBR



smo2014-005-015_b

- 10. iBR fault indicator
- 11. GPS active indicator

1) Multifunction Display

The multifunction display is used to:

- Display the WELCOME message on power up.
- Activating and setting modes of operation.
- Display scrolling messages of function activation or system faults.
- Display the accumulated engine hours.
- Provide various indications as selected by the operator.

NOTE: If a fault occurs, the multifunction display will periodically scroll the applicable fault message and revert to the default indication, depending on the severity of the fault detected.

2) Fuel Level Indication

A bar gauge located in the RH side of the multifunction display continuously indicates the amount of fuel in the fuel tank while riding.

When the fuel tank is full, 8 segments (bars) of the indicator are turned on.

When there is only 2 segments of fuel indicated (approximately 12 L (3.2 U.S. gal.)), the following indications will come ON to advise you that a low fuel condition exists.

LOW FUEL LEVEL INDICATIONS	
Last 2 fuel gauge segments	Flashing
Fuel tank symbol	
Audible advisory (a 2 second beep)	Periodically (every 5 minutes)

3) Low Fuel Level Indicator

When the low fuel indicator starts flashing, it indicates that there is approximately 12 L (3.2 U.S. gal.) of fuel left in fuel tank.

4) Check Engine Light

The check engine light comes ON when a fault is detected by the engine management system.

The check engine light may be accompanied by the applicable scrolling fault message in the multifunction display.

5) High Temperature Indicator

The high temperature indicator comes ON when a high engine temperature or a high exhaust system temperature is detected.

6) Low Oil Pressure Indicator

When this indicator is ON, it indicates a low oil pressure condition which may be due to a low oil level. Look for a message in the multifunction display.

7) Maintenance Reminder Indicator

The maintenance reminder indicator comes ON when required maintenance is due.

8) Touring Mode Indicator

When the TOURING mode indicator is ON, the default TOURING mode is active.

Refer to *INTELLIGENT THROTTLE CONTROL (ITC)* subsection for details.

NOTE: Touring mode is only applicable to the ACE 900 HO models.

9) Sport Mode Indicator

The SPORT mode indicator is normally off.

When sport mode of operation is selected, the SPORT mode indicator will come on and stay on until sport mode is deactivated, or the watercraft is shut down.

NOTE: Sport mode is only available on the ACE 900 HO models. It is not the default riding mode. To be active, it must be selected on after starting the engine.

Refer to *INTELLIGENT THROTTLE CONTROL (ITC)* subsection for detailed instructions.

10) iBR Fault Indicator (Models with iBR)

The iBR fault indicator comes ON when a fault in the iBR system has been detected.

Refer to *TROUBLESHOOTING* subsection for details.

11) GPS Active Indicator (Models with iBR)

A GPS incorporated in the multifunction gauge provides the speed in the multifunction display.

This is confirmed when the GPS active indicator is visible in the digital screen.

MULTIFUNCTION DISPLAY MESSAGES

ADVISORY MESSAGES	
WELCOME ABOARD SEA-DOO	Power up display
RPM	RPM indication
ENTERING SPORT MODE - INCREASED ACCELERATION - INSTRUCT PASSENGERS TO HOLD - PRESS SET BUTTON	Message when SPORT mode is selected
SPORT MODE ACTIVATED	Message when SPORT mode is activated
SPORT MODE - RETURN TO IDLE TO ACTIVATE	Message when SPORT mode cannot be activated, engine not at idle
SPORT MODE ACTIVE - RETURN TO IDLE TO CANCEL	Message when SPORT mode is in use
SPORT MODE DEACTIVATED	Message when user first returns to TOURING mode
FAULT MESSAGES	
LO OIL	Engine low oil pressure detected
HI EXHAUST TEMP	High exhaust temperature detected
HI ENGINE TEMP	High engine temperature detected
CHECK ENGINE	Engine system malfunction or maintenance required
HI BATTERY VOLTAGE	High battery voltage detected
LO BATTERY VOLTAGE	Low battery voltage detected
LIMP HOME	Major fault detected, engine power limited
FUEL SENSOR DEFECTIVE	Fuel level sensor fault
CALIBRATION CHECKSUM ERROR	Cluster programming corrupted, need to be re-flashed using B.U.D.S.
MAINTENANCE REQUIRED	Watercraft maintenance required
OTAS FAILURE	OTAS is not correctly adjusted
iBR FAILURE	iBR Fault

TROUBLESHOOTING

DIAGNOSTIC TIPS

NOTE: It is a good practice to check for fault codes using B.U.D.S. software as a first troubleshooting step. Refer to *COMMUNICATION TOOLS AND B.U.D.S.* subsection.

IMPORTANT: When troubleshooting an electrical system fault, check battery condition, cables and connections first.

Electrical System Activation

1. Press the START/STOP button.

NOTE: Pressing the START/STOP button without the tether cord installed on the engine cut-off switch will turn on electrical power without starting the engine; the multifunction gauge will cycle through a self-test function and shut off its display after a few seconds. However, the electrical system will stay powered up for approximately three minutes after the START button was pressed.

2. After pressing the START/STOP button, install the tether cord on the engine cut-off switch to maintain the multifunction gauge active when testing procedures require it to stay active.

IMPORTANT: When B.U.D.S. is being used, the ECM will eventually stop communicating with B.U.D.S. Therefore, operations with B.U.D.S. will

be interrupted. To reestablish communication, briefly press the START button. **Do not hold** the START button to avoid engine starting.

Circuit Testing

Check the related-circuit fuse condition with a fuse tester or ohmmeter (a visual inspection could lead to a wrong conclusion).

Electrical Connection Inspection

When replacing an electric or electronic component, always check electrical connections. Make sure they are tight, make good contact, and are corrosion-free. Dirty, loose or corroded contacts are poor conductors and are often the source of a system or component malfunction.

Pay particular attention to ensure that pins are not bent or pushed out of their connectors.

Ensure all wire terminals are properly crimped on wires, and connector housings are properly fastened.

Check for signs of moisture, corrosion or dullness. Clean pins properly and coat them with DIELECTRIC GREASE (P/N 293 550 004) or other appropriate lubricant when reassembling them, except if otherwise specified such as for the ECM connectors.

Pay attention to ground wires.

TROUBLESHOOTING GUIDELINES

Press the START/STOP button and install the tether cord on the engine cut-off switch.

NOTE: The multifunction gauge should come on, cycle through its self test function, and stay on for approximately 3 minutes after which all electrical power will turn off.

Briefly press the START/STOP button every 3 minutes to reenergize the electrical system. Do not hold the START/STOP button to avoid engine starting.

NOTE: When troubleshooting using the following guidelines, it is important to remember that some indications, functions and features described may not apply to every PWC model, or may be available as an option.

Multifunction Gauge “Does Not Turn ON”

If the multifunction gauge does not turn ON when the START/STOP button is pressed, the power circuit or ground circuit to the multifunction gauge is probably open.

Check the following in the listed order:

- 15A battery fuse (F3)
- 10A ACC fuse (F1)
- 5A START/STOP fuse (F2)
- Test for battery voltage at contacts on top of the ACC fuse (F1)
- If voltage good on both contacts of F1, carry out *MULTIFUNCTION GAUGE INPUT VOLTAGE TEST*
- Continuity of gauge ground circuit (gauge connector pin 4 (BLACK wire) to engine or battery ground)
- If no voltage at F1, test relay in fuse box
- Refer to *ECM WAKE-UP CIRCUIT TEST* in *ELECTRONIC FUEL INJECTION (EFI)* subsection.

NOTE: When testing for power, be sure to test within 3 minutes after pressing the START button.

Multifunction Gauge Turns ON with Some Indications Missing

1. Connect to the latest applicable B.U.D.S. version, refer to *COMMUNICATION TOOLS AND B.U.D.S.* subsection.
2. Read the fault codes, refer to *DIAGNOSTIC AND FAULT CODES* subsection.

If a fault code is related to a communication problem, carry out a continuity test of the CAN bus wires. Refer to *WIRING DIAGRAM* and *CONTROLLER AREA NETWORK (CAN)* subsections.

NOTE: The multifunction gauge, ECM, and the diagnostic connector are linked together through CAN bus. If one wire of the two wire CAN bus system is open, communication will be slower than normal. Multiple fault codes may be generated and the ECM may put the watercraft in LIMP HOME mode.

If one module cannot be seen in B.U.D.S., the fault may be the wires that link the module to the CAN bus, or a problem internal to that module. Test the CAN bus wires of the faulty module for continuity before assuming the problem is the module.

Multifunction Gauge Goes Blank Except for:

- Fuel level ON
- No other indications visible.

There is no communication between the multifunction gauge and the ECM.

Subsection 05 (MULTIFUNCTION GAUGE)

Carry out a continuity check of the CAN bus wires from the multifunction gauge to the ECM and diagnostic connector. Refer to the *WIRING DIAGRAM* and *CONTROLLER AREA NETWORK (CAN)* subsections for details.

If an open circuit is detected, carry out same test from the 20 pin steering connector (pins 2 and 3).

NO RPM Indication and NO Engine Hour Display

If there is NO RPM indication, and NO engine hour display (on power-up), and the watercraft is in LIMP HOME mode, the CAN bus to the ECM is open.

Carry out a continuity check of the CAN bus wires from the ECM module, connector "B" pins C1 and C2 (B-C1 and B-C2) to the gauge and diagnostic connector. Refer to the *WIRING DIAGRAM* and *CONTROLLER AREA NETWORK (CAN)* subsections for details.

NO Fuel Level Indication

If there is no fuel level indication, test the fuel level sensor and its wiring circuit to the multifunction gauge. Refer to *FUEL TANK AND FUEL PUMP* subsection.

Beeper Does Not Function

The beeper is incorporated within the multifunction gauge.

If no beep code is heard when pressing the START button and installing the tether cord, first ensure ECM is powered. Refer to *ELECTRONIC FUEL INJECTION (EFI)* subsection.

In B.U.D.S., carry out the following:

- **Cluster Buzzer Test** on the cluster activation page
- Check for fault codes. Carry out service actions as applicable.

If the **Cluster Buzzer Test** failed, the ECM is powered, and the ECM and multifunction gauge are communicating properly through the CAN bus, replace the multifunction gauge.

PROCEDURES

MULTIFUNCTION GAUGE

Multifunction Gauge Self Test Function

When the START/STOP button is pressed momentarily and the vehicle powers up, all LCD segments and indicator lights in the multifunction gauge will turn **ON for approximately 3 seconds**

(self test function). This self test function allows the driver time to ensure that all indications are functioning properly.

It also validates the multifunction gauge internal circuits, however, this does not validate proper operation of the individual external circuits and sensors that provide inputs to the multifunction gauge.

If a system fault is detected by the ECM, the applicable message and/or indicator light will be displayed, and a beep code may be heard.

If the tether cord is not installed, the indications in the multifunction gauge will shut off a few seconds after the self test function, but the electrical system power stays on for approximately 3 minutes. Installing the tether cord on the engine cut-off switch will turn the indications back on.

If the tether cord is installed, the multifunction gauge will stay on for approximately 3 minutes.

NOTE: If the START/STOP button is pressed and held without the tether cord installed, the multifunction gauge will stay on as long as the START button is held.

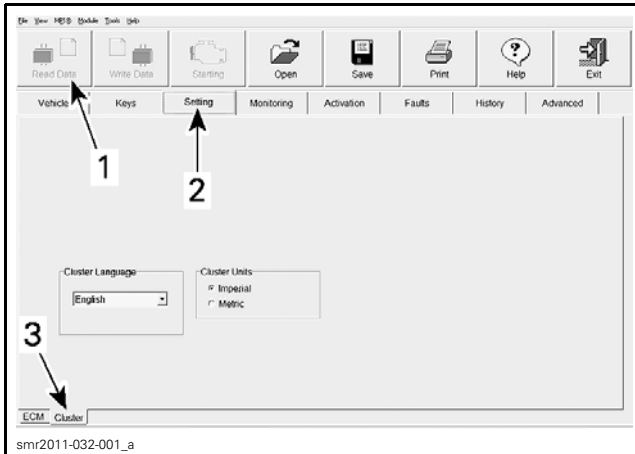
Multifunction Gauge Setup

Units of Measurement and Language Setting

1. Connect vehicle to the latest applicable B.U.D.S. version, refer to the *COMMUNICATION TOOLS AND B.U.D.S.* subsection.
2. Press the START/STOP button to energize the electrical system.

NOTE: You will need to press the START button every three minutes or the electrical system will shut off.

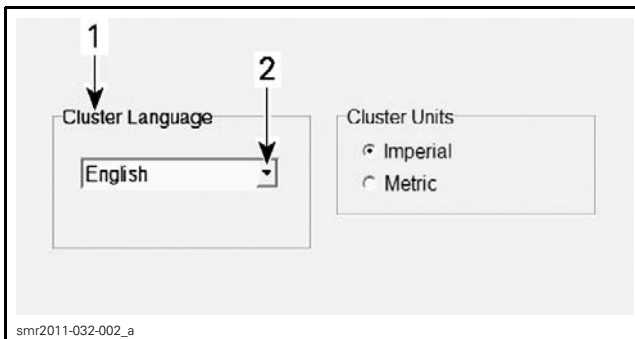
3. In B.U.D.S., select the following:
 - **Read Data** button
 - **Setting** page tab
 - **Cluster** tab.



TYPICAL

1. Read Data
2. Setting tab
3. Cluster tab

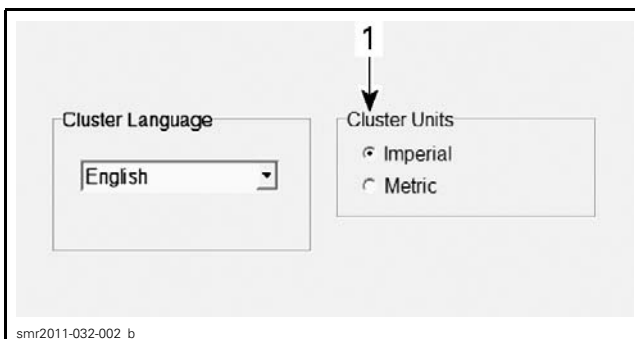
In the **Cluster Language** field, choose the desired unit of language.



TYPICAL

1. Cluster Language field
2. Click on this arrow to expand list of available languages

In the **Cluster Units** field, choose the desired unit of measurement, **Imperial** or **Metric**.



TYPICAL

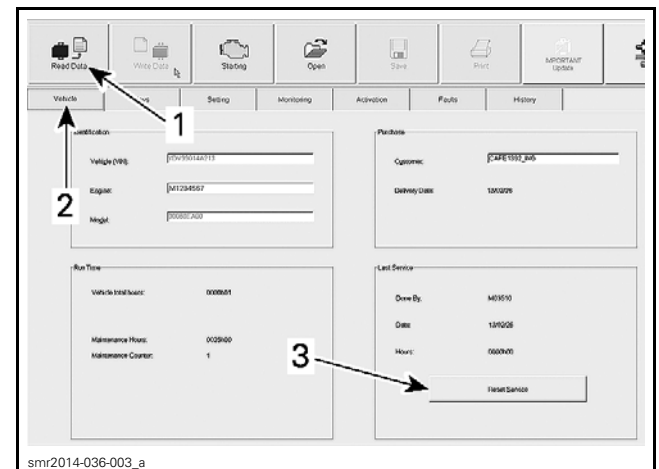
1. Cluster Units field

Clearing the Maintenance Reminder Indicators

When the watercraft or engine are due for maintenance, the maintenance reminder indicator will come on, and a scrolling **MAINTENANCE RE-**

QUIRED message will scroll in the digital screen. These maintenance reminders must be cleared using B.U.D.S.

1. Connect vehicle to the latest applicable B.U.D.S. version, refer to the *COMMUNICATION TOOLS AND B.U.D.S.* subsection.
2. Press the START/STOP button to energize the electrical system.
3. Install the tether cord on engine cut-off switch.
4. In B.U.D.S., select the following:
 - **Read Data** button
 - **Vehicle** page tab
 - In the **Last Service** field, **Reset Service** button.

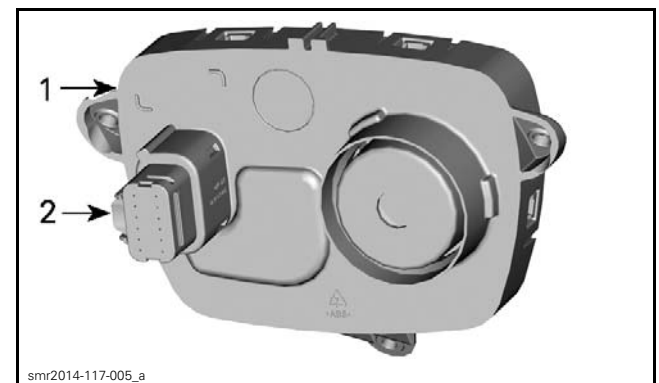


TYPICAL

1. Read Data
2. Vehicle tab
3. Reset Service button

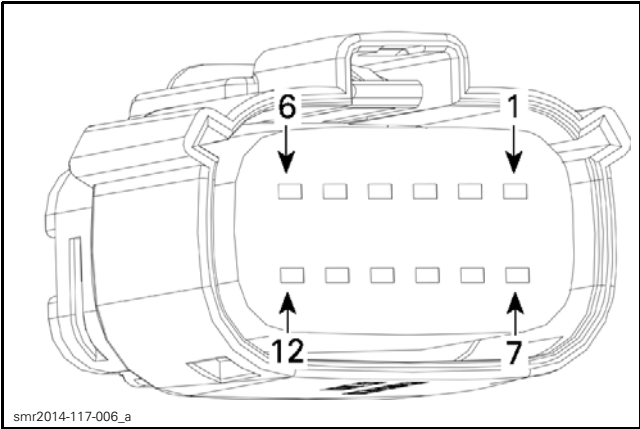
Multifunction Gauge Pin-Out

NOTE: Depending on watercraft model and installed accessories, some multifunction gauge connector pins may not be used.



1. Gauge
2. Gauge connector

Subsection 05 (MULTIFUNCTION GAUGE)



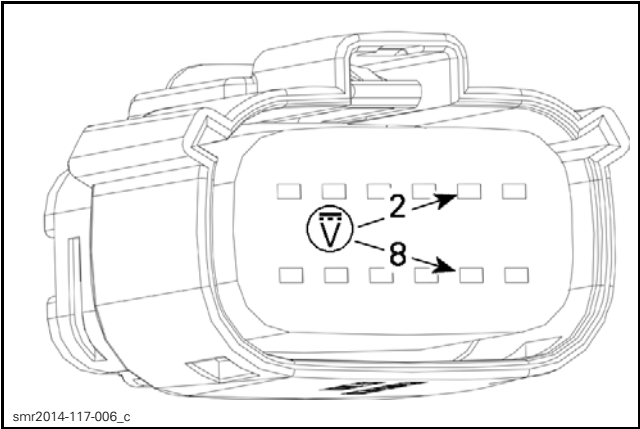
GAUGE CONNECTOR PIN-OUT

MULTIFUNCTION GAUGE PIN-OUT	
PIN NO.	FUNCTION
1	Not used
2	Gauge input Vdc power
3	GPS input Vdc power
4	Fuel level sensor Vdc signal
5	Not used
6	Not used
7	Not used
8	Gauge GND
9	CAN HI
10	CAN LOW
11	Not used
12	Not used

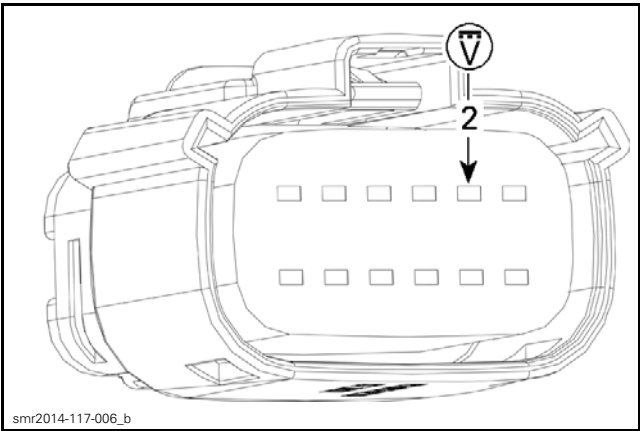
Multifunction Gauge Input Voltage Test (at Gauge Connector)

1. Remove the LH knee pad, refer to *BODY* sub-section.
2. Disconnect the gauge connector.
3. Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to Vdc.
4. Press the START button.
5. Install the tether cord on the engine cut-off switch.
6. Measure the multifunction gauge input voltage as per following table.

INPUT VOLTAGE TEST AT GAUGE CONNECTOR		
PROBE		VOLTAGE
Pin 2 (VT/GY)	Pin 8 (BK)	Battery voltage
Pin 2 (VT/GY)	Battery ground	



INPUT VOLTAGE TEST AT GAUGE CONNECTOR



INPUT VOLTAGE TEST AT GAUGE CONNECTOR

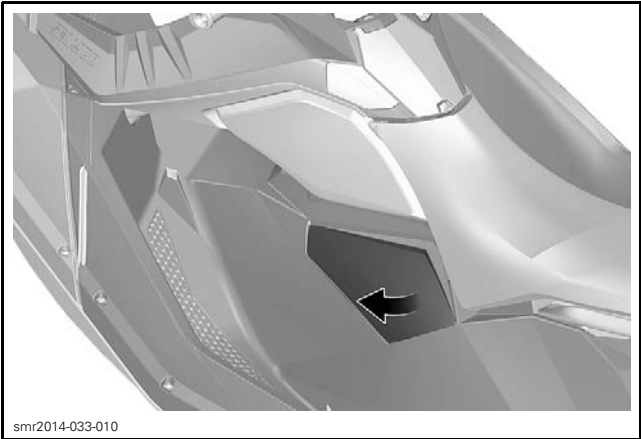
If battery voltage is measured as specified, replace the multifunction gauge.

If battery voltage is measured to battery ground but not to pin 4, carry out a *CONTINUITY TEST OF GAUGE GROUND WIRE* circuit from the gauge connector to the engine ground.

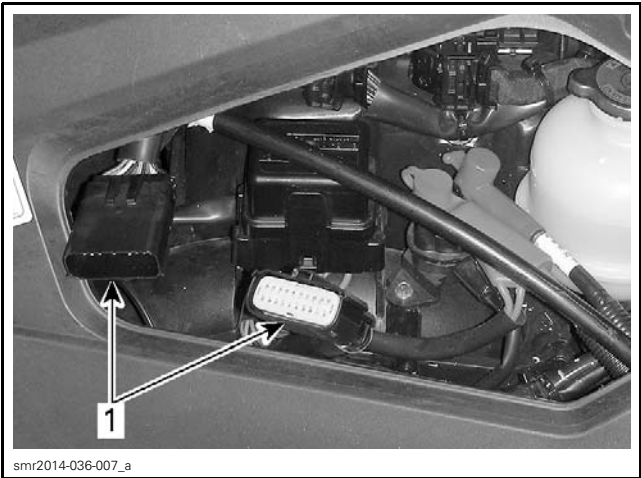
If battery voltage is not measured at the gauge connector, carry out a *MULTIFUNCTION GAUGE INPUT VOLTAGE TEST (AT STEERING CONNECTOR)*.

Multifunction Gauge Input Voltage Test (at Steering Connector)

1. Remove LH access cover, refer to *BODY* sub-section.



2. Disconnect the 20-pin steering connector.



1. Disconnected 20-pin steering connector

3. Connect the diagnostic harness between the disconnected steering connectors.

REQUIRED TOOL	
Diagnostic harness (P/N 529036276)	

4. Press the START/STOP button.
5. Install tether cord on the engine cut-off switch.
6. Carry out an input voltage test at the steering connector (vehicle harness side) as per following table.

MULTIFUNCTION GAUGE INPUT VOLTAGE TEST (STEERING CONNECTOR)		
TEST CONNECTOR ON DIAGNOSTIC HARNESS		VOLTAGE
Pin 20 (VT/GY)	Pin 11 (BK)	Battery voltage
Pin 20 (VT/GY)	Battery ground	

If battery voltage is read at steering connector (vehicle harness side) as specified in preceding table, but was not measured to pin 4 at the gauge con-

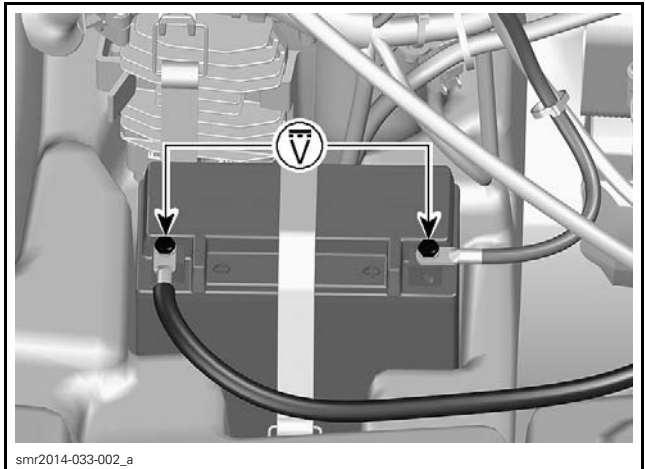
necter (gauge ground wire), repair or replace the BLACK ground wire between the gauge connector and the steering connector.

If battery voltage is measured to battery ground but not to pin 11, carry out a *CONTINUITY TEST OF GAUGE GROUND WIRE* described further in this subsection.

If no voltage is measured, carry out the following steps.

7. Set multimeter to Vdc and measure voltage at battery terminals.

REQUIRED TOOL
FLUKE 115 MULTIMETER (P/N 529 035 868)



TYPICAL - BATTERY VOLTAGE TEST

8. Remove fuse box cover.

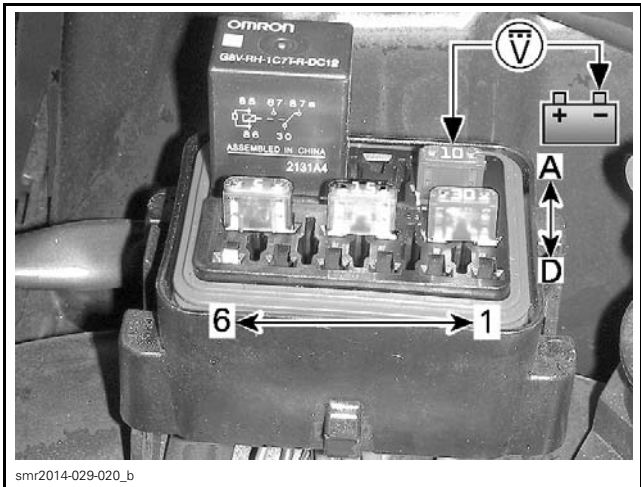


1. Fuse box cover to remove

9. Press the START/STOP button.
10. Install the tether cord.
11. Test for battery voltage between each of the terminals atop the ACC fuse (F1) and battery ground as per following table.

Subsection 05 (MULTIFUNCTION GAUGE)

VOLTAGE TEST AT FB1			
ACC FUSE	TEST PROBES		READING
Fuse pin numbers	B1	Battery (-) post	Battery Vdc
	B2		



VOLTAGE TEST AT FUSE CONTACTS

If battery voltage is measured at B2 but not at B1 (with fuse installed), replace the fuse.

If battery voltage is measured at fuse contact B1, refer to *CONTINUITY TEST OF GAUGE POWER WIRE* in this subsection.

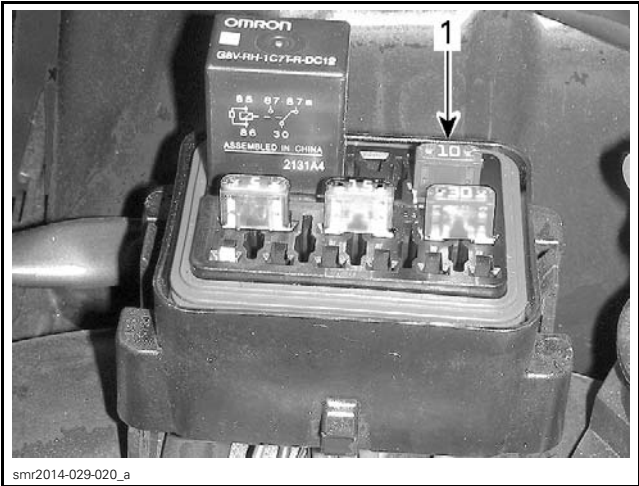
If no voltage is measured at fuse contact E8, refer to *POWER DISTRIBUTION AND GROUNDS* subsection).

Continuity Test of Gauge Power Wire

1. Remove tether cord from engine cut-off switch.
2. Disconnect gauge connector.
3. Disconnect 20-pin steering connector.
4. Connect diagnostic harness between the disconnected steering connectors.

REQUIRED TOOL
Diagnostic harness (P/N 529036276)

5. Remove the ACC fuse (F1).



1. Remove ACC fuse (F1)

6. Set multimeter to Ω setting.
7. Test for continuity of the multifunction gauge power circuit as per following table.

CONTINUITY TEST OF GAUGE POWER CIRCUIT			
GAUGE CONNECTOR	TEST CONNECTOR ON DIAGNOSTIC HARNESS	FUSE BOX	READING
Pin 2 (VT/GY)	Pin 20 (VT/GY)	–	Close to 0 Ω
Pin 2 (VT/GY)	–	Pin B1	
–	Pin 20 (VT/GY)	Pin B1	

8. If an open circuit is measured, pay attention to the following:
 - Pin and socket condition in connectors
 - Proper contact and crimping of pins and sockets in connectors
 - Wire junctions JT-2 (VT/GY) and JT-1 (VT/GY). Refer to *WIRING DIAGRAM* for details.
9. Repair or replace wiring/connectors as required.

Continuity Test of Gauge Ground Wire

1. Disconnect the 20-pin steering connector.
2. Connect the diagnostic harness between the disconnected steering connectors.

REQUIRED TOOL
Diagnostic harness (P/N 529036276)

3. Set multimeter to Ω selection and carry out a continuity test as per following table. Refer to the *WIRING DIAGRAM* for circuit details.

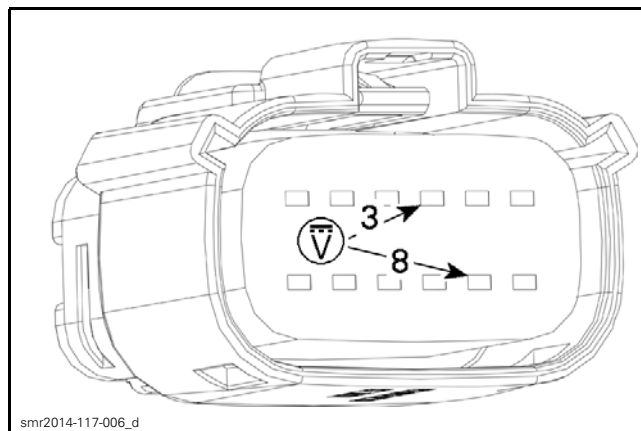
CONTINUITY TEST OF GAUGE GROUND WIRE			
MULTIMETER PROBES			READING
GAUGE CONNECTOR	TEST CONNECTOR ON DIAGNOSTIC HARNESS	ENGINE GROUND	
Pin 8 (BK)	–	✓	Close to 0 Ω
Pin 8 (BK)	Pin 11 (BK)	–	
–	Pin 11 (BK)	✓	

4. Repair wiring and connectors as required.

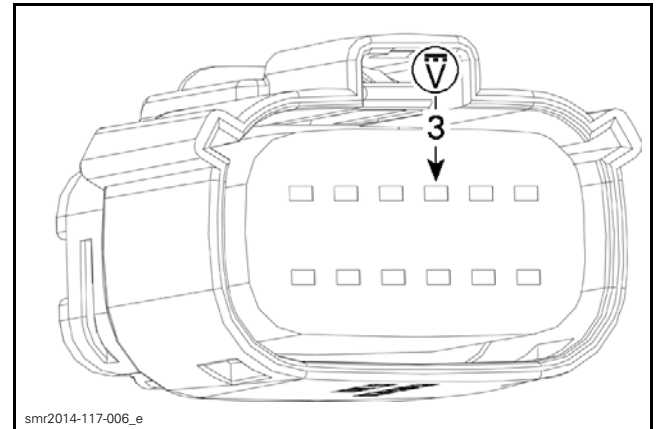
GPS Input Voltage Test (at Gauge Connector)

1. Press the START button.
2. Install the tether cord on the engine cut-off switch.

INPUT VOLTAGE TEST AT GAUGE CONNECTOR		
PROBE		VOLTAGE
Pin 3 (VT/GY)	Pin 8 (BK)	Battery voltage
Pin 3 (VT/GY)	Battery ground	



INPUT VOLTAGE TEST AT GAUGE CONNECTOR



INPUT VOLTAGE TEST AT GAUGE CONNECTOR

GPS Input Voltage Test (at Steering Connector)

1. Press the START button.
2. Install the tether cord on the engine cut-off switch.

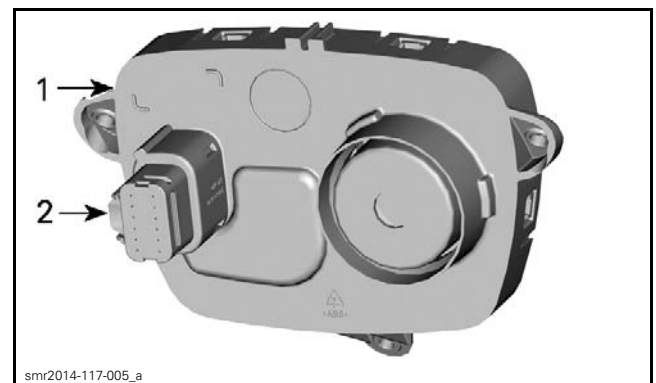
REQUIRED TOOL		
Diagnostic harness (P/N 529036276)		
MULTIFUNCTION GAUGE INPUT VOLTAGE TEST (STEERING CONNECTOR)		
TEST CONNECTOR ON DIAGNOSTIC HARNESS		VOLTAGE
Pin 1 (RD/WH)	Pin 11 (BK)	Battery voltage
Pin 1 (RD/WH)	Battery ground	

Continuity Test of GPS Ground Wire

Refer to *CONTINUITY TEST OF GAUGE GROUND WIRE* in this subsection.

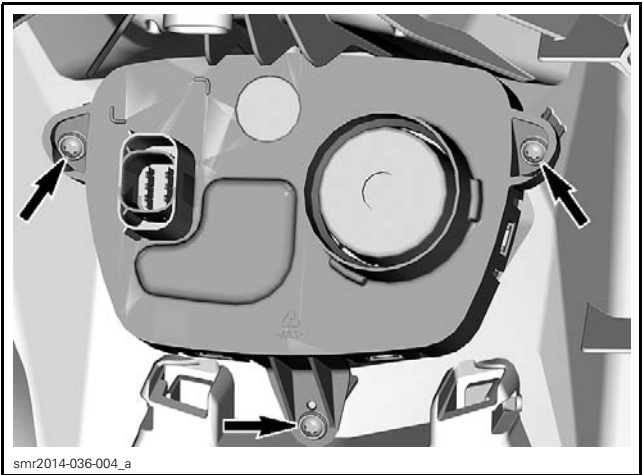
Multifunction Gauge Removal

1. Remove LH or RH knee pad.
2. Reach in under console and disconnect multifunction gauge connector.



1. Multifunction gauge (viewed from under console)
2. Multifunction gauge connector

3. Remove the 3 multifunction gauge mounting screws.



MULTIFUNCTION GAUGE MOUNTING SCREWS (3)

Multifunction Gauge Installation

Installation of the multifunction gauge is the reverse of the removal procedure. However, pay attention to the following.

- 1. Apply a small amount of dielectric grease to the gauge connector pins (harness side).

SERVICE PRODUCT	
Multifunction gauge connector (harness side)	DIELECTRIC GREASE (P/N 293 550 004)

- 2. Reconnect gauge connector and ensure proper operation of gauge.

NOTE: If you are installing a replacement multifunction gauge, refer to *MULTIFUNCTION GAUGE REPLACEMENT* in this subsection.

Multifunction Gauge Replacement

NOTE: Replacement multifunction gauges are delivered already programmed.

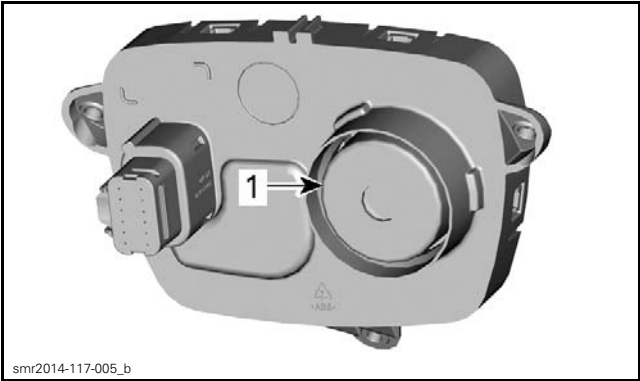
After the multifunction gauge has been replaced, connect the watercraft to the latest applicable B.U.D.S. version and carry out any updates (if required). Refer to *COMMUNICATION TOOLS AND B.U.D.S.* subsection.

Once the multifunction gauge has been updated (if required), refer to *UNITS OF MEASUREMENT AND LANGUAGE SETTING* in this subsection.

BEEPER

Beeper Information

The beeper is part of the multifunction gauge.



1. Beeper

For a the definition of the beeper codes, refer to the *BEEPER SIGNALS* table in the *DIAGNOSTIC AND FAULT CODES* subsection.

Beeper Test

Press START button.

Install the tether cord on the engine cut-off switch. You should hear the beeper.

If you did not hear the beeper, try the beeper test in B.U.D.S..

NOTE: In B.U.D.S., the beeper test can be found on the cluster activation page. It is referred to as the *CLUSTER BUZZER TEST*.

If the beeper still does not sound, replace the multifunction gauge.