

iBR AND VTS

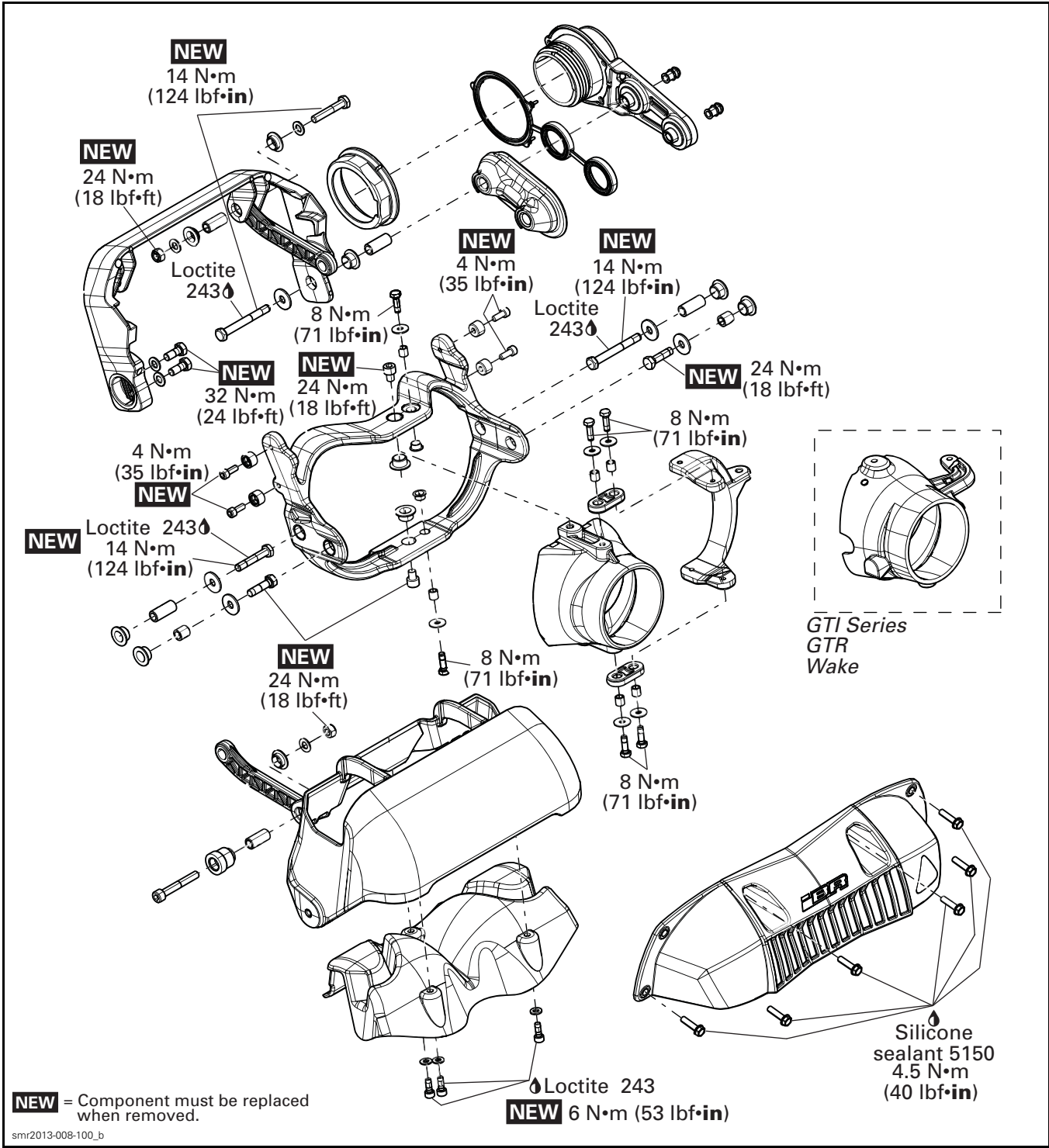
SERVICE TOOLS

Description	Part Number	Page
DIAGNOSTIC HARNESS	529 036 188	15, 17
FLUKE 115 MULTIMETER	529 035 868	15, 22–23, 41

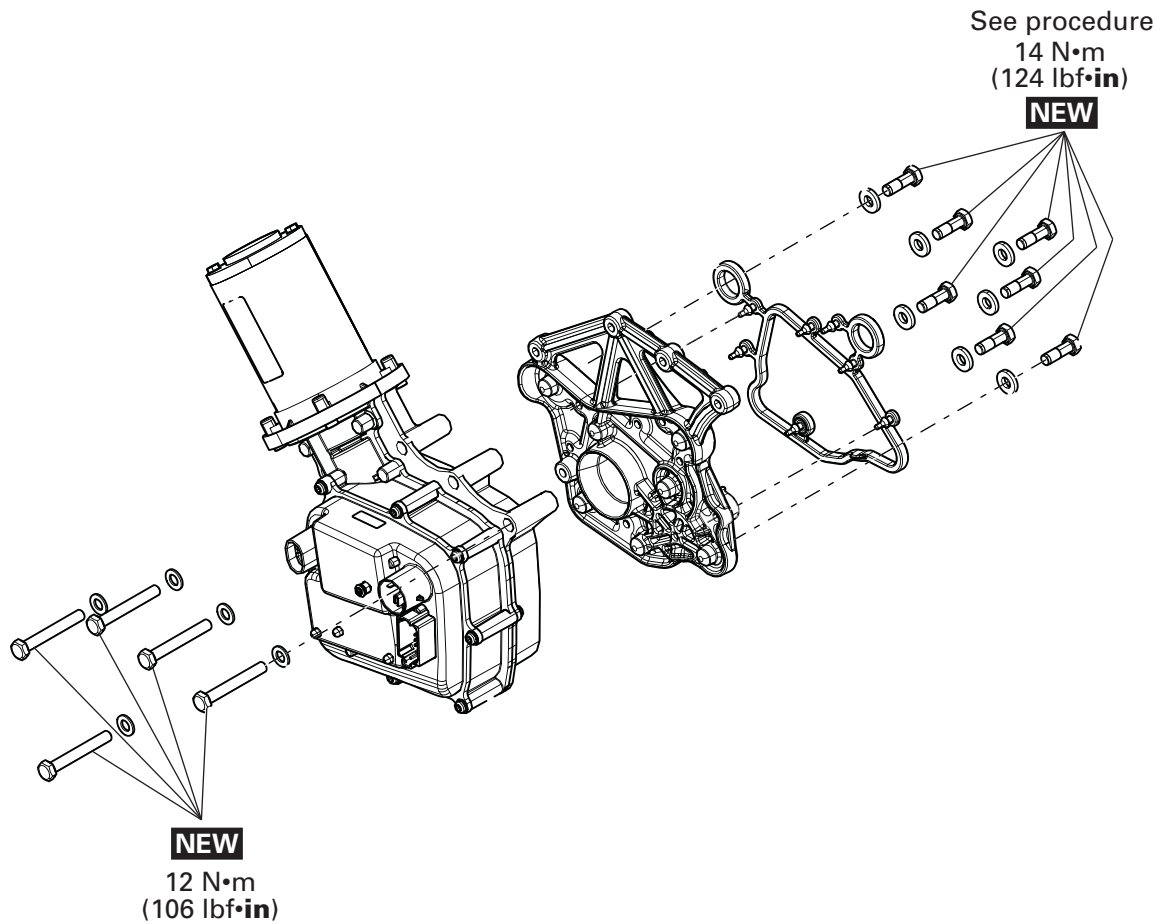
SERVICE PRODUCTS

Description	Part Number	Page
DIELECTRIC GREASE	293 550 004	26, 42
LOCTITE 243 (BLUE).....	293 800 060	26

iBR GATE COMPONENTS



iBR ACTUATOR



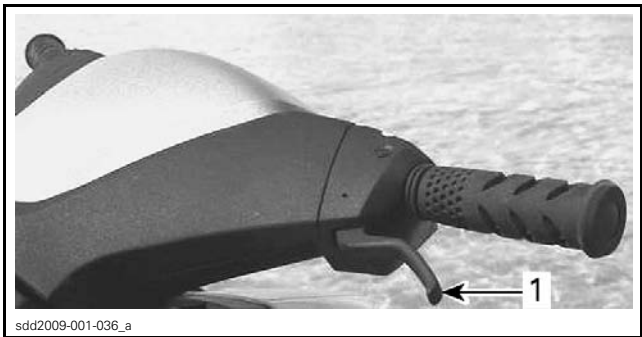
NEW = Component must be replaced when removed.

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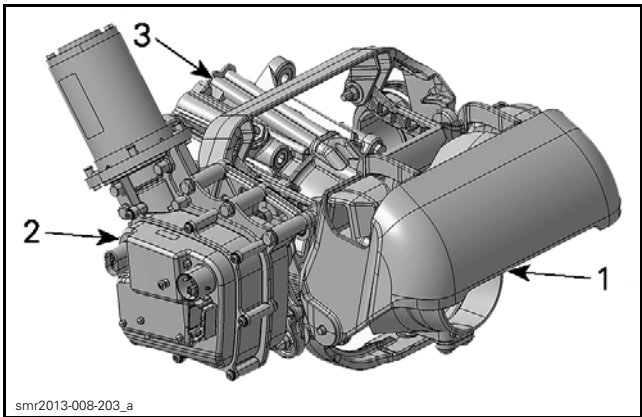
GENERAL

SYSTEM DESCRIPTION (iBR)

The iBR (intelligent Brake and Reverse) is an electronically controlled braking and reverse system. The iBR module controls the position of the iBR gate to provide forward thrust, reverse thrust, braking thrust, and neutral. The operator commands the position of the iBR gate using either the throttle lever for forward thrust, or the iBR lever for neutral, reverse, and for the braking function. The iBR lever is located on the LH side of the handlebar.

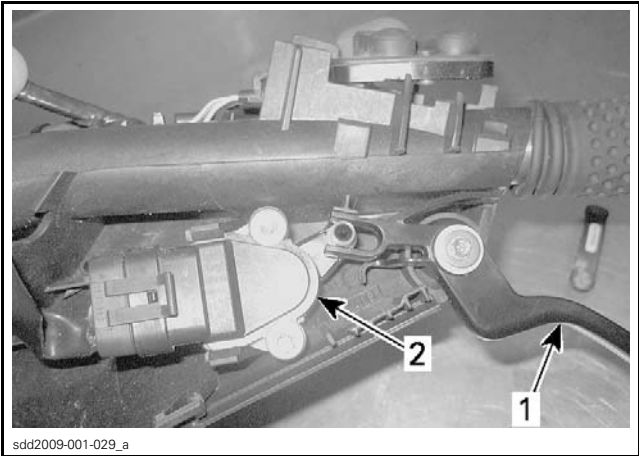


1. iBR lever (intelligent Brake and Reverse)



1. iBR gate
2. iBR module and motor
3. Jet pump

When the iBR lever is pulled in, it operates the brake and reverse lever sensor (BRLS). It is a double output hall effect sensor. The redundancy is used for security purposes.



1. iBR lever
2. BRLS sensor

The BRLS sends the signals to the iBR module. The iBR module controls an electric motor that in turn raises or lowers the iBR gate through a mechanical drive unit.

NOTE: The iBR gate will move when commanded by the iBR lever only if the engine is running. For maintenance purposes, the iBR OVERRIDE function available through the gauge can be used to electrically move the gate to the desired position. The iBR module is programmed with various parameters that it compares to the input signals and information it obtains through the CAN bus from the other electronic modules.

Depending on vehicle speed and how far the iBR lever is pulled in, the iBR module will automatically adjust the iBR gate movement speed and stroke.

NOTE: The iBR lever must be pulled in at least 25% of its travel (approximately) before the iBR gate starts to move. The first 25% of iBR lever travel has no effect on the iBR gate.

Every time the iBR gate moves when commanded by the iBR lever, engine RPM is momentarily reduced to idle speed as the gate moves.

⚠ WARNING

If it is necessary to remove any foreign object catch in the iBR gate, nozzle or linkages, strictly observe the following before proceeding:

- Remove tether cord from engine cut-off switch.
- Wait at least 5 minutes or remove iBR fuses.
- Do not press on START/STOP button. If START/STOP button is pressed, wait another 5 minutes.

Forward Mode

To engage forward:

- Start engine
- Pull in the throttle lever.

The iBR gate will automatically move to the forward position (full up).

NOTE: The full up position of the iBR gate is dependent on the selected VTS trim position.

Reverse Mode

If the watercraft speed is below 8 km/h (5 MPH) when the iBR lever is pulled in, reverse mode is engaged.

When the iBR lever is pulled in to engage reverse, the following occurs:

- Engine RPM is reduced to idle.
- The iBR gate moves to the reverse position.
- Engine RPM ramps up to the engine power commanded by the throttle lever.

When operating in reverse mode, the iBR lever controls the iBR gate position and the engine RPM is controlled by the throttle lever.

The iBR gate position can be modulated anywhere between the neutral and full reverse positions depending on the position of the iBR lever. If the iBR lever position is varied during reverse operation, engine RPM is reduced to idle every time the iBR gate moves. It is therefore recommended to maintain the iBR lever completely pulled in.

Maximum engine RPM in reverse is 5000 RPM.

Braking Mode

If the watercraft speed is 8 km/h (5 MPH) per hour and above when the iBR lever is pulled in, braking mode is engaged.

When the iBR lever is pulled in to engage braking, the following occurs:

- Engine RPM is reduced to idle.
- The iBR gate moves to the maximum down position.
- Engine RPM ramps up to the engine power commanded by the iBR lever.

When operating in braking mode, the iBR gate always moves to the maximum down position. The throttle lever signal is overridden and engine RPM is now dependent on watercraft speed and how far the iBR lever is pulled in.

If watercraft speed is high when braking is applied, engine power will be initially low and then ramp up to the power commanded by the iBR lever position. The engine RPM may be in-

creased, as necessary, to apply a stronger braking effect with the jet pump thrust when the conditions dictate.

As the watercraft slows to less than 8 km/h (5 MPH), the following occurs:

- Braking mode ceases.
- Reverse mode takes over if the iBR lever is not released.
- Throttle control reverts back to the throttle lever.

Neutral Mode

Every time the iBR lever is pulled in and released, the iBR gate will default to the **neutral** position, except if the throttle lever is still pulled in when the iBR lever is released. If the throttle lever is still pulled, the iBR gate will move to the forward position when the iBR lever is released and the watercraft will accelerate forward.

iBR Override Function

To permit easy access to the jet pump, nozzle, iBR gate, and various linkages for inspection, maintenance, cleaning or removal of debris, the iBR system provides for an iBR override function that is accessible through the information center.

When iBR override is activated, it allows the user to electrically move the iBR gate and nozzle through its full range of motion.

NOTICE An object or tool catch in the iBR gate, nozzle or linkages when using the iBR override function may cause damage to these components. Remove any foreign object that may obstruct the iBR gate travel.

Activating iBR Override Function

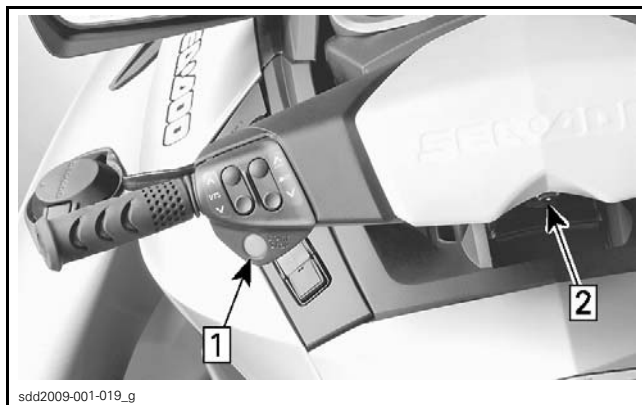
WARNING

When using the iBR override function, ensure nobody stands near the rear of the watercraft. Movement of the iBR gate may squeeze fingers.

To use the iBR override function, carry out the following step.

1. Press the START/STOP button.
2. Install the tether cord.

Subsection XX (iBR AND VTS)

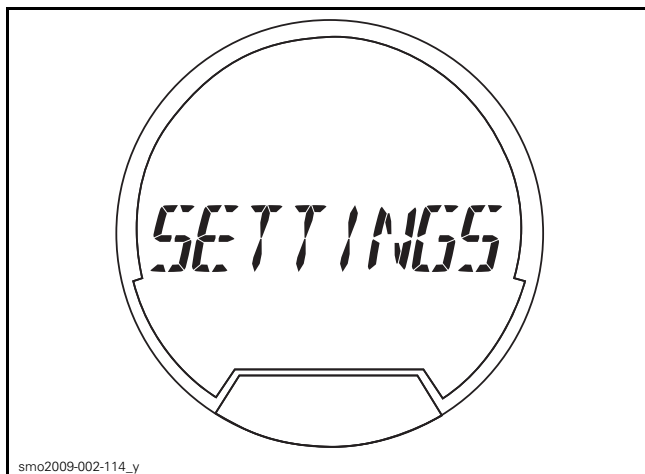


Step 1: Press START/STOP button

Step 2: Install tether cord

NOTE: Do not start the engine. The tether cord must be installed to ensure the information center will not shut off all indications after its self test function. Briefly press the START/STOP button to reactivate the electrical system when required.

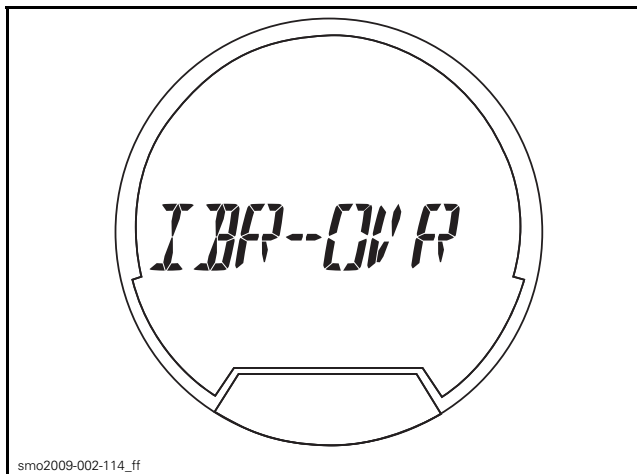
3. Press the **Mode** button on the RH handlebar repeatedly until SETTINGS is visible in the digital display of the information center.



SETTINGS

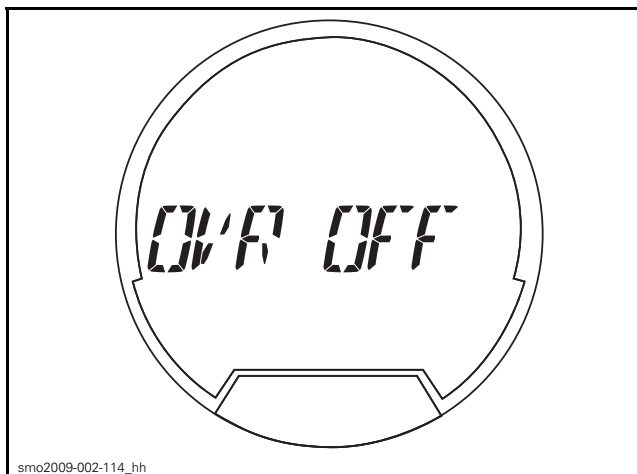
4. Press the SET button (RH handlebar) to enter the **Settings** function.

5. If iBR OVR is not the following function displayed, press the UP/DOWN arrow button until iBR OVR is displayed.



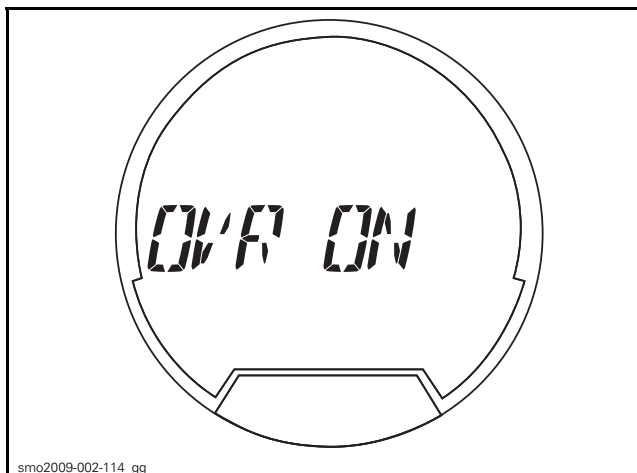
iBR OVERRIDE

6. Press the SET button to enter iBR OVR function and display OVR OFF.



OVERRIDE OFF

7. Press the UP/DOWN arrow button (RH handlebar) to display OVR ON.



OVERRIDE ON

8. Press the SET button to select the OVR ON function. The gauge will return to its normal display.

Models with a VTS Switch

9. Press the VTS UP or DOWN button (LH handlebar) to move the iBR gate.

Models Without a VTS Switch

10. Press the UP/DOWN arrow button (RH handlebar) to move the iBR gate.

Deactivating iBR Override Function

To deactivate the iBR override function, carry out one of the following:

1. Repeat previous steps and press the SET button when OVR OFF is visible.
2. Remove tether cord and wait for the electrical power to shut off (approximately 3 minutes).
3. Start the engine.

NOTE: When the engine is started, the iBR OVR function is deactivated and the iBR gate will move to the neutral position.

⚠ WARNING

When moving the iBR gate using the iBR override function, ensure nobody stands near the rear of the watercraft. Movement of the gate may squeeze fingers.

SYSTEM DESCRIPTION (VTS)

The VTS system is actually part of the iBR system. It provides watercraft pitch trim adjustments by adjusting the horizontal position of the jet nozzle.

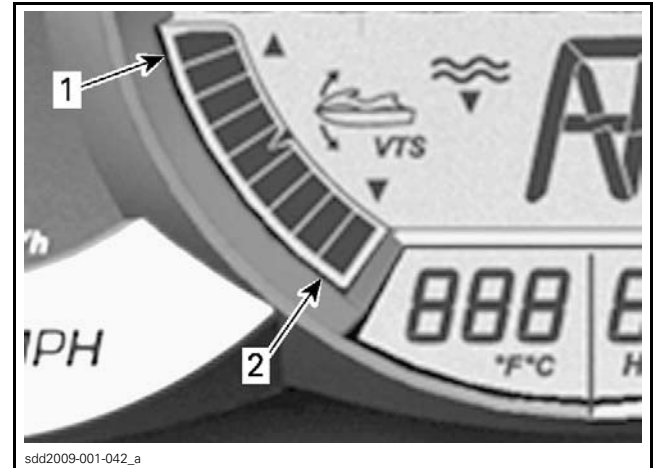
The VTS can be electrically trimmed to the desired attitude within the VTS range, or to one of 2 preset trim positions.

The VTS switch (or Up/Down switch) sends command signals to the gauge. The gauge converts them to CAN protocol and sends them through the CAN bus to the iBR module on the iBR actuator. The actuator then moves the iBR gate which moves the nozzle to the desired trim position.

NOTE: The nozzle and iBR gate move together in the VTS trim range up to the maximum nozzle down position. If NEUTRAL, BRAKING or REVERSE is engaged, the iBR gate moves past the VTS full down position. When FORWARD thrust is reengaged, the nozzle and iBR gate move up to the last selected VTS trim position.

The nozzle trim position can be seen on the VTS position indicator in the information center.

NOTE: Changing the VTS trim position without the engine running in forward thrust mode only changes the indication. The nozzle will move to the selected VTS trim position when forward thrust is engaged.



INFORMATION CENTER — VTS POSITION INDICATOR

1. Bow up
2. Bow down

NOTE: Only the segment indicating the relative position of the VTS will be on. The illustration shows all segments on as can be seen during the self test function.

The VTS system provides the following features according to models

- Nozzle trimming
- Selection of 2 preset trim positions
- Recording of 2 preset trim positions.

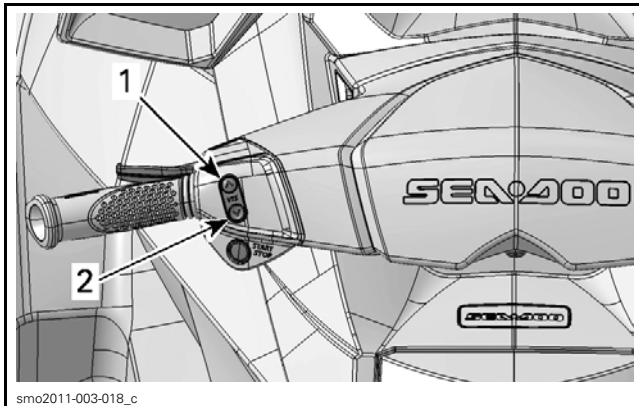
Nozzle Trimming

Watercraft must be operating in forward position.

Depending on the model, 5 or 9 trim positions are available.

Using the VTS Button (LH Side of Handlebar)

Press the UP or DOWN arrow button to change the VTS setting.

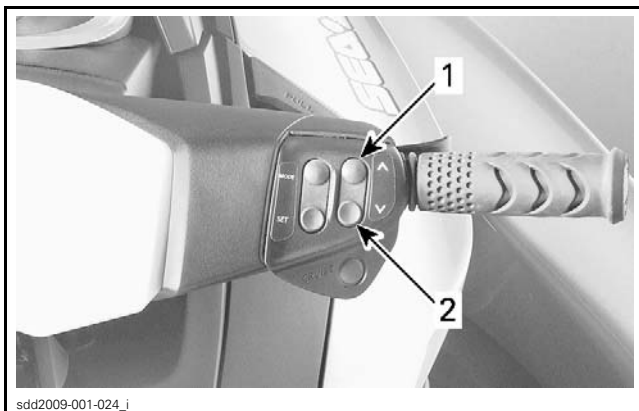


TYPICAL - VTS CONTROL BUTTON

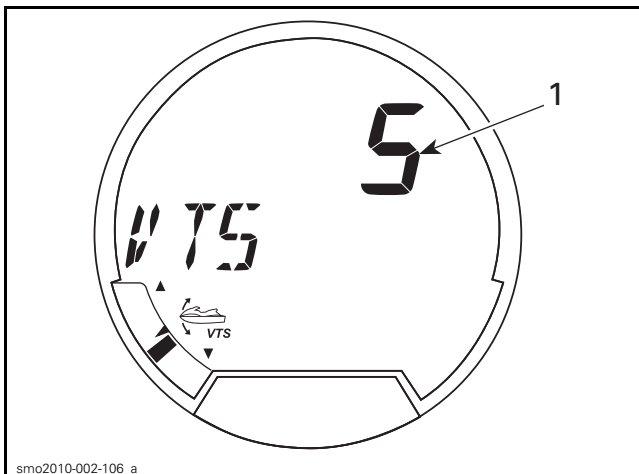
1. Bow up
2. Bow down

Using the Up/Down Button (RH Side of Handlebar)

1. Press the MODE button to display the VTS function in the gauge.
2. Press the UP or DOWN arrow button to change the VTS setting.



1. Bow up
2. Bow down



FUNCTION SELECTED - VTS

1. VTS setting

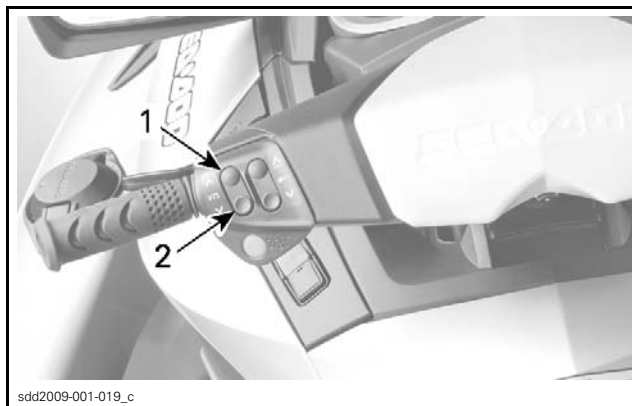
3. Press the SET button to save the desired setting.

Using Preset Trim Positions

Two preset trim positions can be selected.

To select the **highest** trim position recorded, double-click on the VTS UP arrow button (bow up).

To select the **lowest** trim position recorded, double-click on the VTS DOWN arrow button (bow down).



TYPICAL - DOUBLE-CLICK UP OR DOWN TO USE PRESET POSITIONS

1. Highest preset position on UP arrow
2. Lowest preset position on DOWN arrow

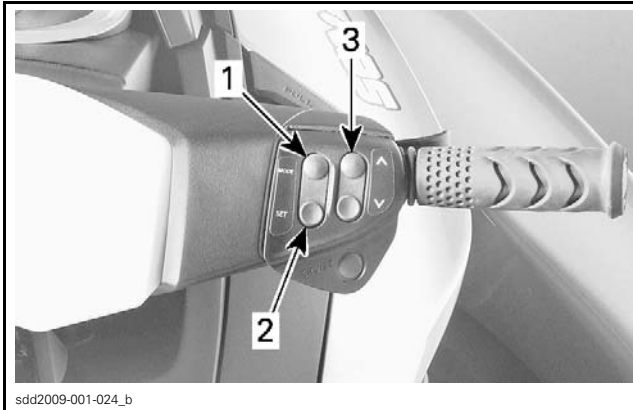
Recording Preset Trim Positions

Two different VTS trim positions may be recorded for quickly selecting the preferred watercraft trim attitude.

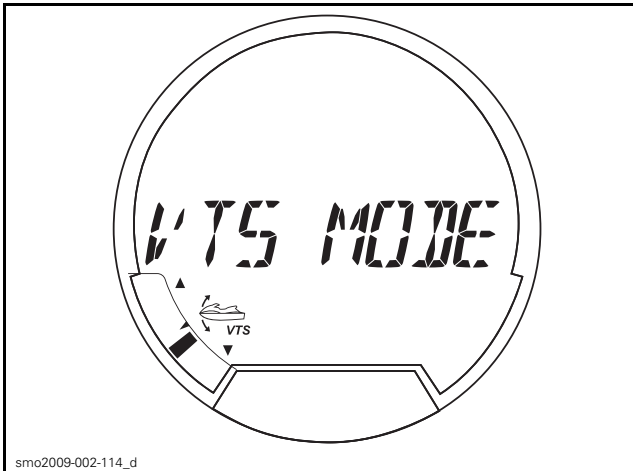
When the VTS PRESET trim positions are changed, the new settings will remain recorded in memory.

To record VTS preset trim positions:

1. Press the START/STOP button.
2. Install the tether cord on the engine cut-off switch.
3. Press the MODE button repeatedly until VTS MODE is displayed.

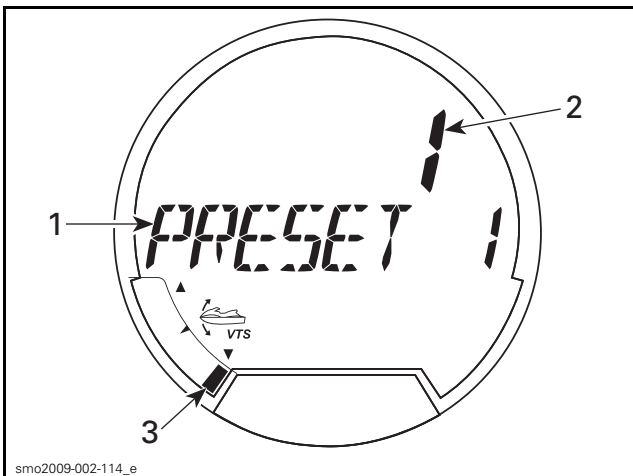


1. MODE button
2. SET button
3. UP/DOWN arrow button



FUNCTION SELECTED - VTS MODE

4. Press the SET button to display PRESET 1.
5. Press the VTS UP/DOWN button to change the PRESET 1 VTS position.



FUNCTION SELECTED - PRESET 1

1. Preset 1 function
2. VTS setting selected to 1
3. VTS position indicator at setting 1 (bow down)

6. Press the SET button to save PRESET 1 and display PRESET 2.

7. Set PRESET 2

8. Press the SET button to save the settings.

NOTE: The VTS system will compare the preset trim settings recorded, the highest position will be assigned to the UP arrow (bow up), the lowest to the DOWN arrow.

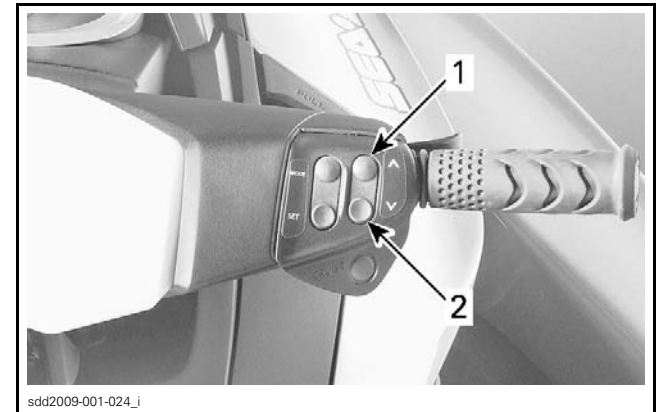
ADJUSTMENT

IBR NEUTRAL ADJUSTMENT

When in NEUTRAL, if the watercraft creeps forward or backward, the iBR system may be trimmed.

If the watercraft is moving forwards, momentarily press the DOWN arrow button on RH side of handlebar.

If the watercraft is moving backwards, momentarily press the UP arrow button on RH side of handlebar.



TRIMMING THE iBR NEUTRAL POSITION

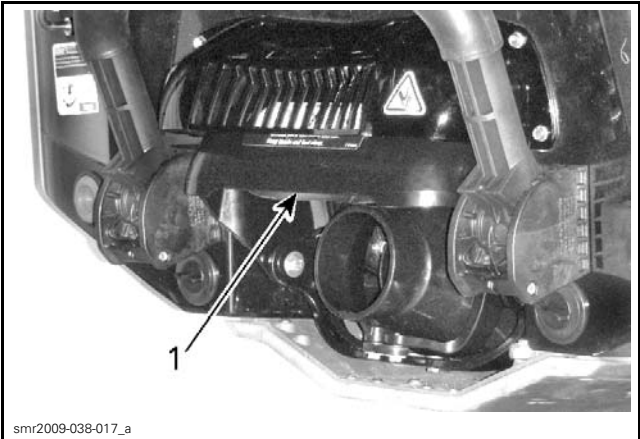
1. UP arrow button (to stop rearward movement)
2. DOWN arrow button (to stop forward movement)

NOTE: Press the UP/DOWN arrow button repeatedly until proper adjustment of the neutral position is attained and the watercraft stops moving.

MAINTENANCE

iBR GATE BACKLASH CHECK

1. Using the iBR override function, move the iBR gate to the up position. Refer to *SYSTEM DESCRIPTION (iBR)* in this subsection.



1. iBR gate moved to up position

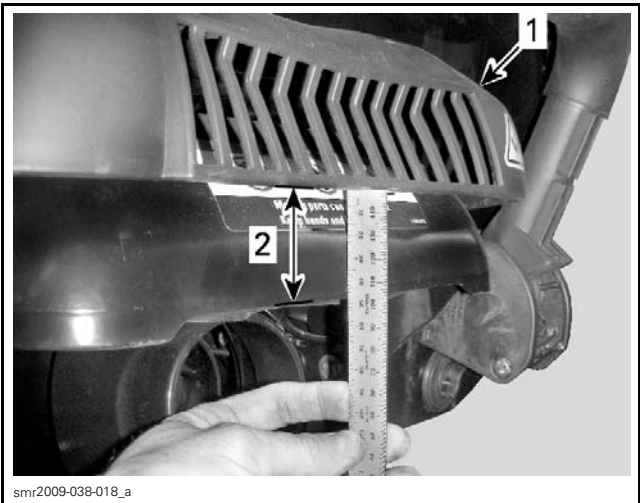
2. Take hold of the lower edge of the iBR gate and pull down on it slightly, then release it.



PULL DOWN SLIGHTLY ON iBR GATE

Distance "A" Measurement

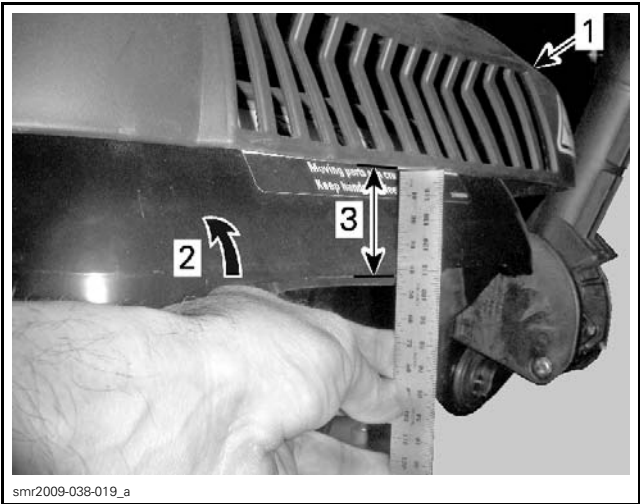
Using a machinists ruler, measure the distance between the bottom of the guard and the trailing edge of the iBR gate. Note as measurement "A".



1. iBR guard
2. Measurement "A"

Distance "B" Measurement

Without using excessive force, push up on the trailing edge of the iBR gate to pick up the backlash in the gate mechanism. As you hold the gate up, measure the distance between the trailing edge of the guard and the trailing edge of the iBR gate again. Note as measurement "B".



1. iBR guard
2. Lift up on iBR gate
3. Measurement "B"

iBR Gate Backlash Calculation

Subtract measurement "B" from "A" to obtain the iBR gate backlash.

iBR GATE BACKLASH (A - B)	
MAXIMUM	25 mm (.98 in)

Backlash Measurement Result

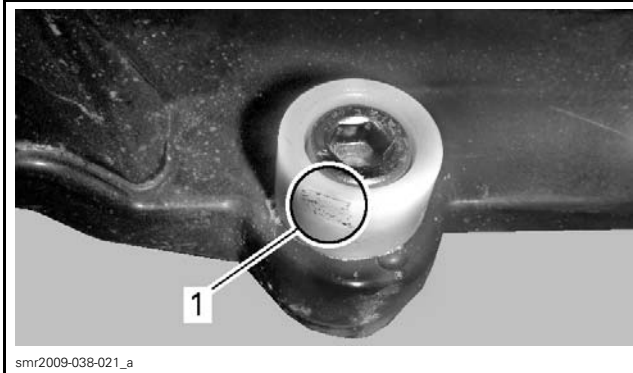
If backlash is excessive, inspect and replace iBR gate parts as required in the following order:

1. Tightening of screws retaining the U-arm to the actuator shaft
2. Ribs on actuator shaft end and in U-arm
3. Friction sleeves
4. Bushings
5. Contact points (VTS trim ring, U-arm, iBR gate)
6. iBR actuator.

Check iBR gate backlash and gate operation after parts replacement and reassembly.

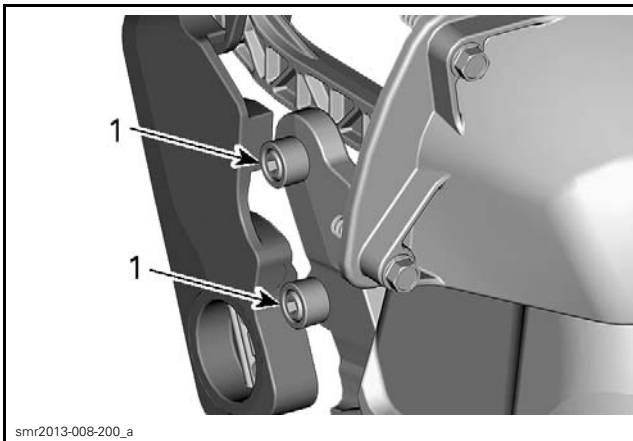
FRICITION SLEEVE REPLACEMENT

The 4 friction sleeves on the VTS trim ring should be replaced if they show signs of advanced wear (flat spots), or every 100 hours as per the maintenance schedule.



1. Worn friction sleeve (flat spot)

1. To replace the friction sleeves, remove the iBR gate and VTS ring as an assembly, refer to *iBR GATE AND VTS RING REMOVAL* in this subsection.



1. Friction sleeves (2 per side)

2. Remove the worn friction sleeves from the VTS ring and install new ones.
3. Apply service products, torques, and install new screws with threadlocker as specified in the exploded view.

INSPECTION

iBR SYSTEM FUNCTIONAL TEST

Test on Dry Land

NOTE: This test requires two persons. One person to start engine and operate controls, and one person to observe iBR gate movement.

1. Provide adequate ventilation of exhaust gases or move watercraft outside.

NOTICE Do not install an exhaust ventilation hose in the iBR gate area or damage may occur when the iBR gate moves downward during operation.

2. Connect a water hose to the watercraft to provide exhaust system cooling when operating engine. Refer to *EXHAUST SYSTEM* subsection for procedure.

NOTICE

- Ensure there are no tools or other object that may interfere with the iBR gate movement.
- Do not run engine for more than 2 minutes out of water or damage may occur to drive shaft seal carrier.

⚠ WARNING

The person observing the iBR gate movement must stand to the side of the stern well clear of the iBR gate and pump nozzle in full view of the operator.

3. Start engine and let idle.

NOTE: If iBR gate was not in the neutral position, it will move to the neutral position on engine start up.

4. Depress the throttle lever slightly and visually confirm the iBR gate moves to the forward position (up to the VTS trim position), then release throttle. The iBR gate must remain in the forward position.
5. Depress the iBR lever fully and confirm the iBR gate moves to the full down position.
6. Release the iBR lever completely and confirm the iBR gate moves to the neutral position.
7. Disconnect water hose then shut engine off.

Test with Watercraft on a Waterway

1. Start engine and let idle.

NOTE: If iBR gate is not in the neutral position before the engine start, it will move to the neutral position on engine start up.

- 2. Depress the throttle lever slightly, then release it. Forward movement of the watercraft confirms the iBR gate has moved to the forward position.
- 3. Depress the iBR lever fully. Rearward movement of the watercraft confirms the iBR gate has moved to the reverse position.
- 4. Release the iBR lever completely. Reverse thrust should cease and the watercraft should continue to drift rearward on momentum.
- 5. Apply a small amount of forward thrust to stop rearward velocity, then tap the iBR lever to return the iBR gate to neutral.
- 6. Shut engine off.

VTS FUNCTIONAL TEST

NOTE: This test requires two persons. One person to start engine and operate controls, and one person to observe nozzle and iBR gate movement.

- 1. Provide adequate ventilation of exhaust gases or move watercraft outside.

NOTICE Do not install an exhaust ventilation hose in the iBR gate area or damage may occur when the iBR gate moves downward during operation.

- 2. Connect a water hose to the watercraft to provide exhaust system cooling when operating engine. Refer to *EXHAUST SYSTEM* subsection for procedure.

NOTICE

- Ensure there are no tools or other object that may interfere with the iBR gate movement.
- Do not run watercraft for more than 2 minutes out of water or damage may occur.

⚠ WARNING

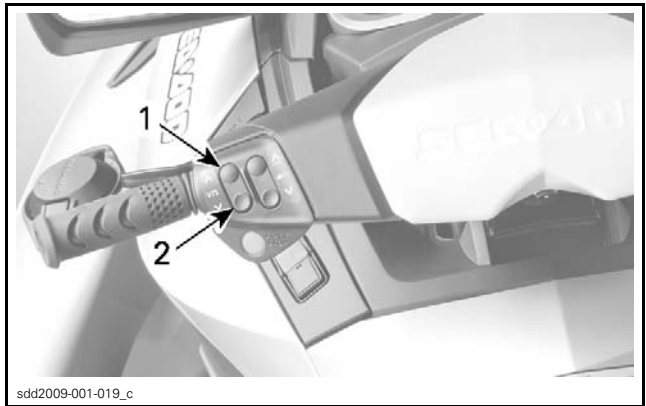
The person observing the iBR gate movement must stand to the side of the stern well clear of the iBR gate and pump nozzle in full view of the operator.

NOTE: The VTS system cannot be tested without the engine operating in forward thrust. If the engine is not running in forward thrust, only the VTS indication will change when the VTS control button is pressed; the nozzle will not change position until forward thrust is engaged by pulling the throttle lever.

- 3. Start engine.
- 4. Pull in and release the throttle lever to engage forward thrust, allow engine to run at idle RPM.

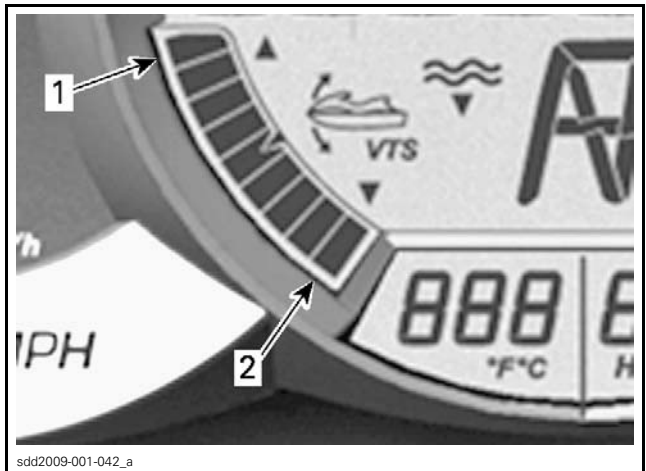
Models with a VTS Switch

- 5. Push the VTS UP and DOWN button alternately to check VTS operation.



1. VTS up button
2. VTS down button

- 6. Confirm nozzle movement and VTS position indication change in the information center.



1. Bow up
2. Bow down

NOTE: Only the segment indicating the relative position of the VTS will be on. The illustration shows all segments on as visible during the gauge self test function.

7. Double click the VTS UP and DOWN button alternately to test the VTS preset trim positions.

If double clicking the VTS UP or DOWN button does not cause the nozzle position or indication to change, navigate to the VTS MODE function in the gauge and check for recorded PRESET 1 and PRESET 2 settings. If no presets are recorded, record PRESET 1 bow up and PRESET 2 bow down, exit the function and carry out a new test.

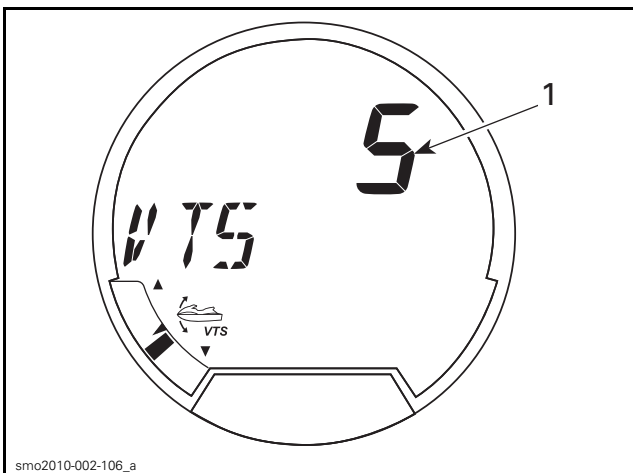
If both PRESET 1 and PRESET 2 have the same setting, note the operator's setting and change one PRESET, exit the function and carry out a new test. Return the PRESET to the operator's preference after testing is complete.

Models Without a VTS Switch

8. Press the MODE button to display VTS.



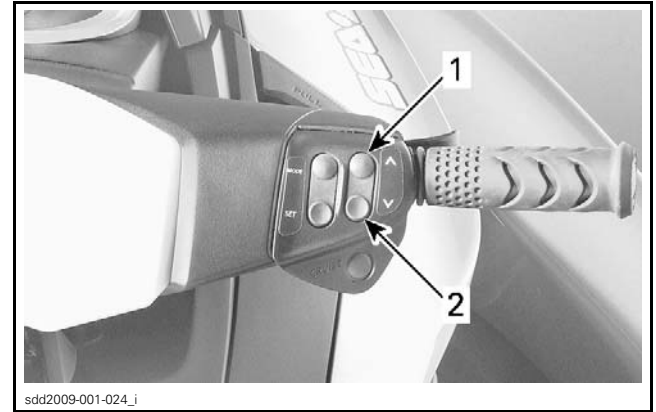
1. MODE button



VTS FUNCTION

1. VTS setting

9. Press the UP/DOWN arrow button (RH handlebar) to change the VTS angle.



1. UP arrow button

2. DOWN arrow button

10. Ensure the VTS setting in the gauge moves with the VTS.

TROUBLESHOOTING

The iBR system is self monitoring. If a fault occurs in the iBR system, it will raise a fault code and communicate it to the information center through the CAN bus. The information center will turn on the iBR indicator light to advise the operator of the iBR system fault. If the fault remains active, it may be displayed in the gauge. If it is no longer active, B.U.D.S. must be used to read the fault.

TESTING SEQUENCE

To troubleshoot the iBR system, carry out the following in this order:

- Ensure the iBR gate movement is not obstructed in any way.
- Ensure the iBR gate mechanisms (gate, VTS ring, U-arm and linkages) are all in good condition and do not show signs of excessive wear or friction.
- Cycle the iBR gate up and down using the *iBR OVERRIDE* function as described in this subsection.
- Check the iBR power fuse (F5) and the iBR control fuse (F17) in fuse box if the gate did not move using the iBR OVERRIDE function.
- Connect the watercraft to B.U.D.S. to check for iBR system or CAN bus related fault codes. Carry out service actions as indicated in B.U.D.S.
- If a CAN bus communication fault with the iBR module is indicated, or the iBR module is not visible in B.U.D.S., carry out a continuity test of the CAN bus wires between the iBR module and the CAN bus-bars in fuse box. Refer to *CONTROLLER AREA NETWORK (CAN)* subsection.

Subsection XX (iBR AND VTS)

- Try moving the iBR using the iBR UP and iBR DOWN buttons on the iBR activation page in B.U.D.S.
- Carry out an *iBR SYSTEM FUNCTIONAL TEST* to check for proper gate and actuator movement.
- Visually inspect system connectors for moisture ingress, corrosion, and proper contact.
- Check for excessive backlash in the gate mechanism.
- Remove the screws retaining the U-arm to the actuator shaft. Verify alignment, refer to *iBR MECHANISM ALIGNMENT VERIFICATION*.

PROCEDURES

iBR LEVER SENSOR (BRLS)

BRLS Test Using B.U.D.S.

NOTE: The BRLS is composed of a twin hall effect sensor. A resistance test of the sensor cannot be carried out.

1. Connect watercraft to the latest B.U.D.S. software, refer to *COMMUNICATION TOOLS AND B.U.D.S.*
2. Check for an applicable fault code, refer to *DIAGNOSTIC AND FAULT CODES*.
3. If a fault is indicated, follow service actions as indicated in B.U.D.S.

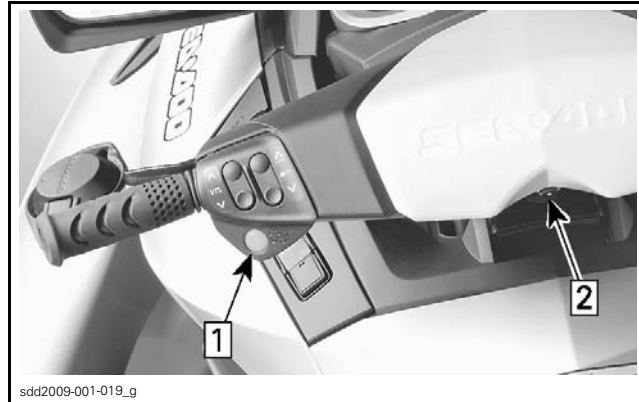
BRLS Voltage Test

Test for BRLS input voltage as well as BRLS signal voltages as per following steps.

Models with Suspension

1. Press the START/STOP button.
2. Install the tether cord on the engine cut-off switch to energize the electrical system.

NOTE: DO NOT start the engine.



sdd2009-001-019_g
Step 1: Press START/STOP button
Step 2: Install tether cord

NOTE: Briefly press the START/STOP button to reactivate the electrical system when required.

3. Set the suspension to its maximum height. This will provide better access to the steering connectors.

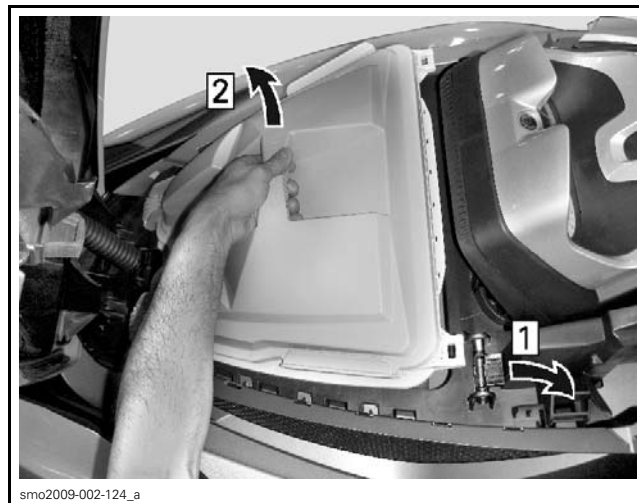
NOTE: If more height is required or if the iS system cannot be used, manually lift the suspension using a hoist and the anchor points close to handlebars. Then safety lock it in the up position.

NOTICE Do not lift the watercraft using the anchor points.

4. Remove the tether cord and wait approximately 3 minutes for the electrical system power to shut off.

All Models

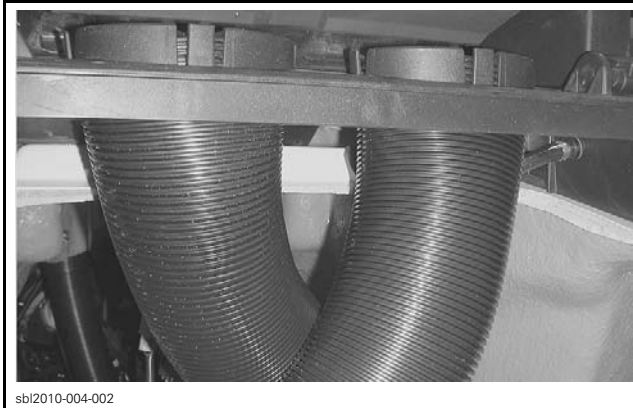
5. Open the front storage compartment cover and remove the storage bin.



smc2009-002-124_a
Step 1: Push storage bin latches backwards (one each side)
Step 2: Lift and tilt forward to remove storage bin

Models Without Suspension

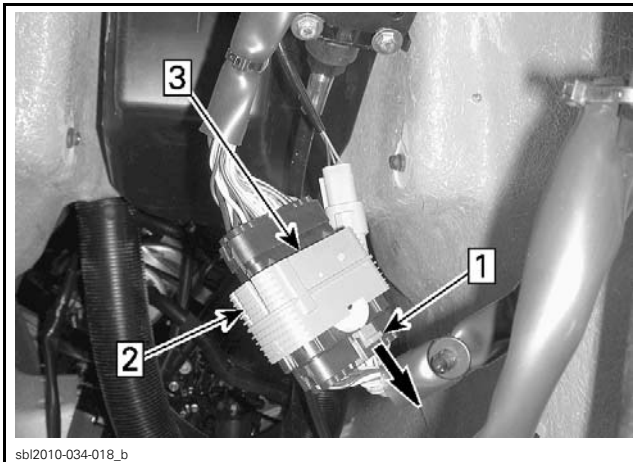
6. Disconnect the top of the two front air ventilation hoses, refer to *BODY* subsection.



FRONT AIR VENTILATION HOSES

All Models

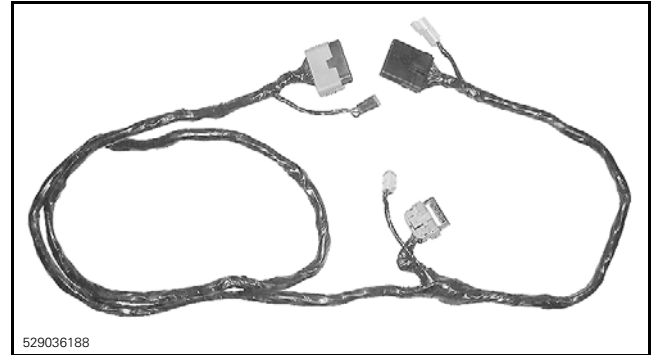
7. Reach in through the storage bin opening under the steering area and disconnect the 24-pin steering connector.



TYPICAL - 24-PIN STEERING CONNECTOR DISCONNECT

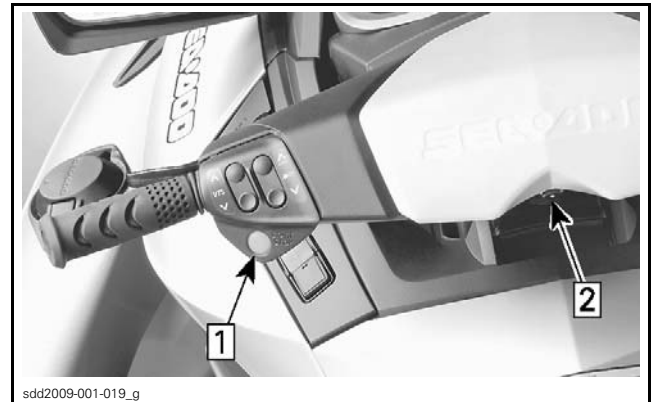
Step 1: Pull out safety lock
Step 2: Press in on release tab
Step 3: Pull locking collar down

8. Connect the DIAGNOSTIC HARNESS (P/N 529 036 188) in series between the disconnected steering connectors.



DIAGNOSTIC HARNESS (P/N 529 036 188)

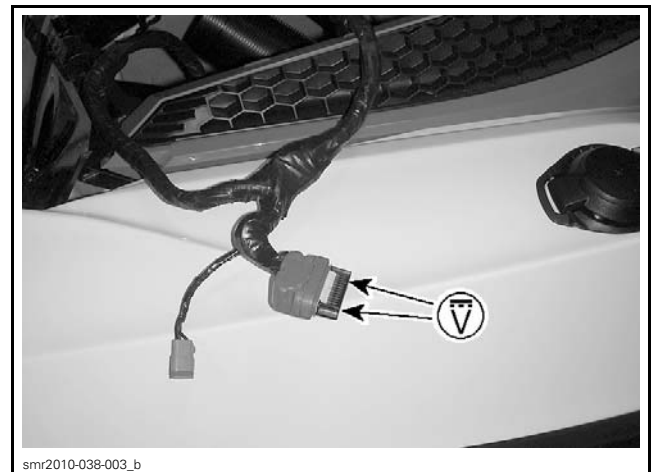
9. Press the START/STOP button to wake up the electrical system.
10. Install the tether cord on the engine cut-off switch.



Step 1: Press START/STOP button
Step 2: Install tether cord

NOTE: Briefly press the START/STOP button to reactivate the electrical system when required.

11. Using a FLUKE 115 MULTIMETER (P/N 529 035 868) set to Vdc, measure the BRLS voltages from the test connector of the diagnostic harness as per following tables.



TEST CONNECTOR OF DIAGNOSTIC HARNESS

TEST CONNECTOR OF DIAGNOSTIC HARNESS		iBR LEVER RELEASED	iBR LEVER PULLED IN
PINS		VOLTAGE (Vdc)	
21	15	4.9 - 5.1	
22	16		
15	18	0.15 - 0.35	1.4 - 1.6
19	16	0.4 - 0.6	2.9 - 3.1

12. If voltage measured is as specified, the BRLS sensor is functioning properly.

NOTE: When moving iBR lever, BRLS voltage change should increase or decrease in a steady linear fashion.

13. If voltage is out of specification, carry out a continuity test of the wiring between the iBR module and the BRLS sensor, refer to *CONTINUITY TEST OF BRLS WIRING HARNESS*.

Continuity Test of BRLS Wiring Harness

1. Ensure the 24-pin steering connector pins are clean, make good contact, and properly connected.

Models Without the X Package

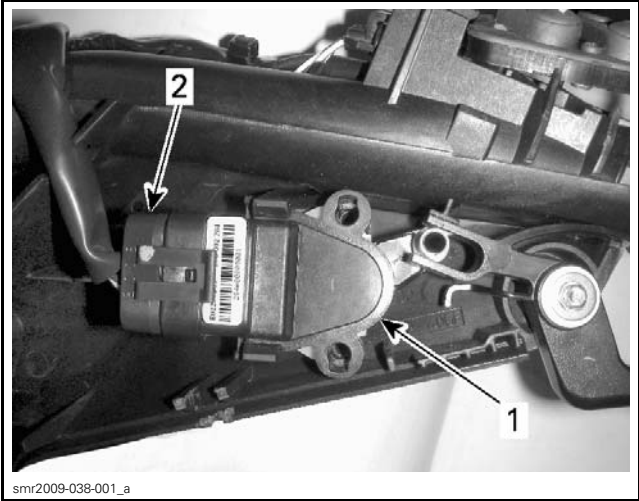
2. Remove the steering cover, refer to *STEERING AND O.T.A.S.* subsection.

Models with the X Package

3. Remove the upper housing and housing cover from the LH handlebar housing, refer to *STEERING AND O.T.A.S.* subsection.

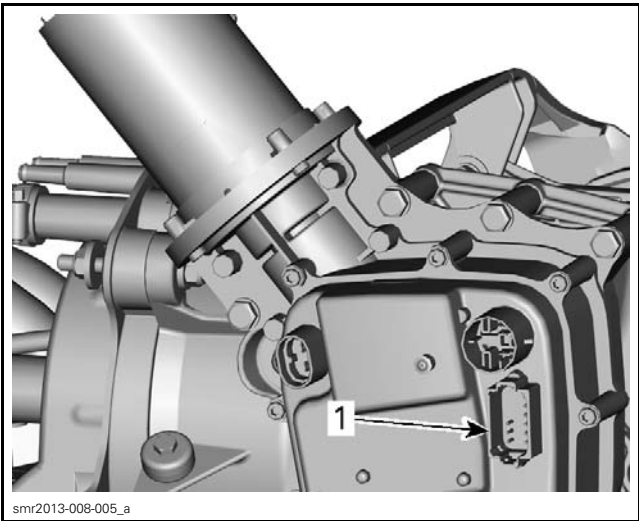
All Models

4. Disconnect the BRLS connector.



TYPICAL
1. BRLS
2. BRLS connector

Disconnect the 12-pin connector from the iBR actuator. Refer to *iBR ACTUATOR CONNECTORS ACCESS* in this subsection.



1. 12-pin connector

5. Measure for continuity from the BRLS connector to the 12-pin iBR actuator connector as per following table.

CONTINUITY TEST OF BRLS WIRING HARNESS		
BRLS CONNECTOR	12 PIN iBR CONNECTOR	RESISTANCE
Pin A (VI/BE)	Pin 4 (VI/BE)	Close to 0 Ω (continuity)
Pin B (BK)	Pin 6 (BK)	
Pin C (YL/BR)	Pin 8 (YL/BR)	
Pin D (VI/BE)	Pin 7 (VI/BE)	
Pin E (BK)	Pin 9 (BK)	
Pin F (YL/WH)	Pin 5 (YL/WH)	

If continuity is good, replace BRLS.

If an open circuit or a higher than normal resistance is measured, carry out the continuity tests in the following tables to find the problem wire or connection:

- From the BRLS to the 24-pin steering connector
 - From the steering connectors to the iBR actuator 12 pin connector.
6. Connect the DIAGNOSTIC HARNESS (P/N 529 036 188) to the steering connector (**steering side only**).

NOTE: Resistance readings may be slightly higher than normal (maximum $.5 \Omega$) when measuring from the test connector on the diagnostic harness.

CONTINUITY TEST BRLS TO 24-PIN STEERING CONNECTOR		
BRLS	TEST CONNECTOR	RESISTANCE
Pin A (VI/BE)	Pin 21 (VI/BE)	Close to 0Ω (continuity)
Pin B (BK)	Pin 15 (BK)	
Pin C (YL/BR)	Pin 18 (YL/BR)	
Pin D (VI/BE)	Pin 22 (VI/BE)	
Pin E (BK)	Pin 16 (BK)	
Pin F (YL/WH)	Pin 19 (YL/WH)	

7. Connect the DIAGNOSTIC HARNESS (P/N 529 036 188) to the steering connector (**vehicle side only**).

CONTINUITY TEST STEERING CONNECTORS TO iBR CONNECTOR		
TEST CONNECTOR	12 PIN iBR	RESISTANCE
Pin 22 (VI/BE)	Pin 7 (VI/BE)	Close to 0Ω (continuity)
Pin 16 (BK)	Pin 9 (BK)	
Pin 19 (YL/WH)	Pin 5 (YL/WH)	
Pin 21 (VI/BE)	Pin 4 (VI/BE)	
Pin 15 (BK)	Pin 6 (BK)	
Pin 18 (YL/BR)	Pin 8 (YL/BR)	

8. Repair or replace wiring/connector as required.

BRLS Removal

Models Without the X Package

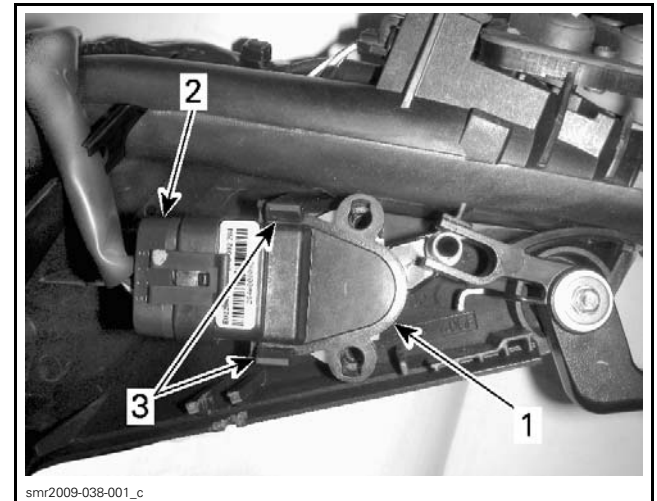
1. Remove steering cover, refer to *STEERING AND O.T.A.S.* subsection.

Models with the X Package

2. Remove the upper housing and housing cover from the LH handlebar housing, refer to *STEERING AND O.T.A.S.* subsection.

All Models

3. Open the sensor retaining tabs.
4. Pull up on the connector end of the BRLS.
5. Gently pull the sensor from its support and the iBR lever. Depress the lever as required to ease sensor removal.



TYPICAL

1. BRLS
2. BRLS connector
3. Sensor retaining tabs

6. Remove connector from the BRLS.

BRLS Installation

Models Without the X Package

1. Install BRLS sensor in the reverse order of removal.
2. Ensure wiring harness is properly routed through slot provided in sensor support before installing steering cover.



1. Wire harness routed in slot

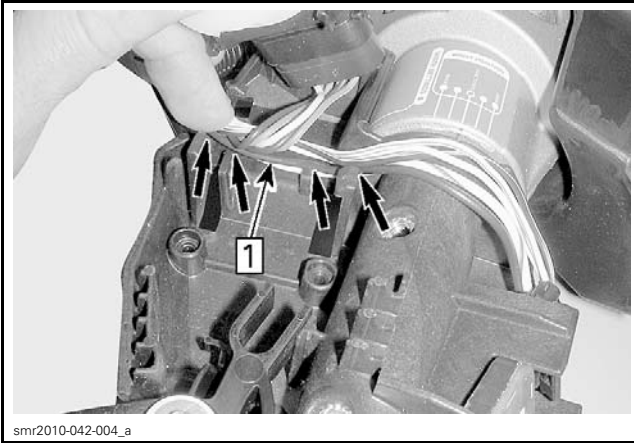
3. Ensure there are no fault codes. Connect watercraft to the latest B.U.D.S. software, refer to *DIAGNOSTIC AND FAULT CODES*.

4. Carry out an *iBR SYSTEM FUNCTIONAL TEST* using the iBR lever (engine must be running).

Models with the X Package

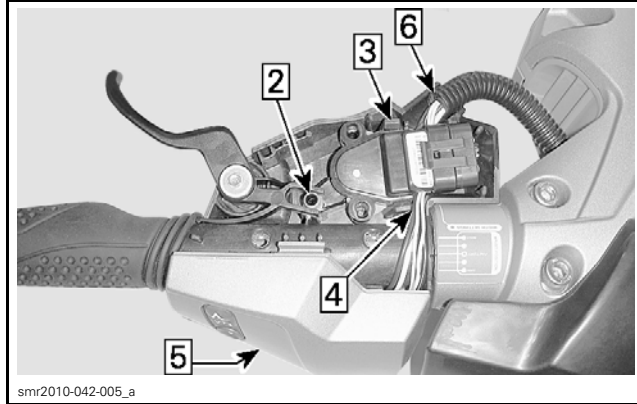
Install BRLS sensor in the reverse order of removal. However, pay attention to the following:

1. Install connector on BRLS and ensure wiring is properly positioned in handlebar housing.



Step 1: Ensure proper wire routing

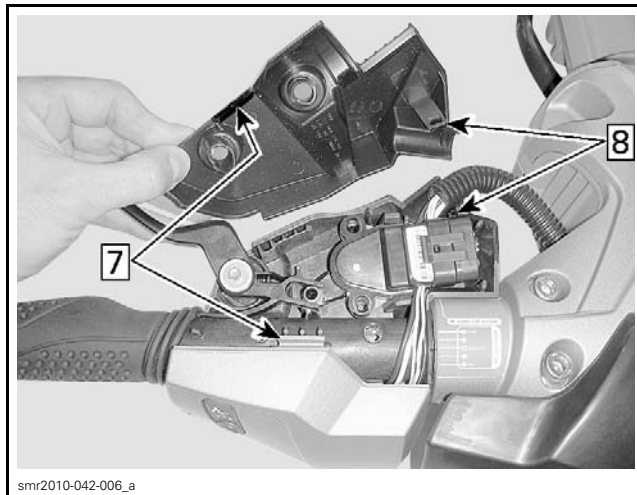
2. Insert the BRLS in the iBR lever.
3. Align the BRLS in the housing, then press it into the housing until both locking tabs engage. Ensure it is properly locked in place.
4. Ensure wiring is not pinched.
5. Position the housing cover onto the handlebar housing.
6. Ensure positioning of corrugated conduit



- Step 2: Insert BRLS in iBR lever
Step 3: Ensure locking tab engagement
Step 4: Ensure wiring is not pinched
Step 5: Install housing cover
Step 6: Ensure proper corrugated conduit positioning

7. Position the upper housing onto the handlebar.

8. Ensure proper engagement of the housing and cover tabs.



- Step 7: Ensure engagement of housing cover retaining tabs
Step 8: Ensure engagement of upper housing locking tabs

9. Install the three retaining screws for the upper housing and torque them to 2 N•m (18 lbf•in).

10. Ensure there are no fault codes. Connect watercraft to the latest B.U.D.S. software, refer to *DIAGNOSTIC AND FAULT CODES*.

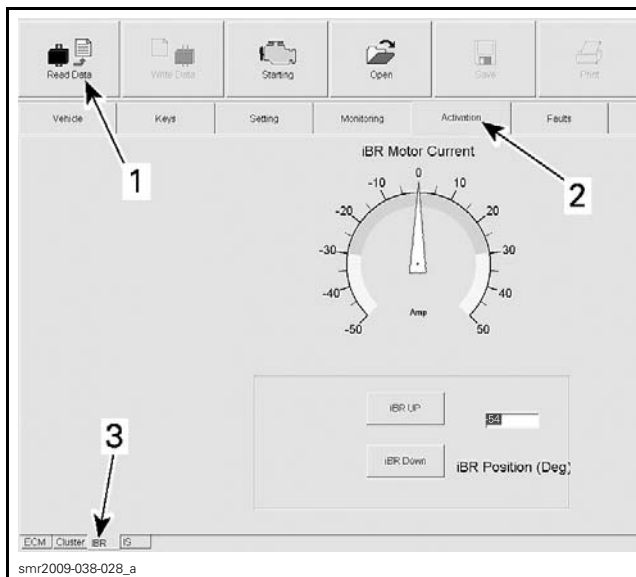
11. Carry out an *iBR SYSTEM FUNCTIONAL TEST* using the iBR lever (engine must be running).

iBR ACTUATOR

NOTICE The iBR actuator motor must never be tested by applying 12 Vdc directly to it's connector. Doing so may cause a lock-up and damage internal actuator components, necessitating replacement of the iBR actuator assembly.

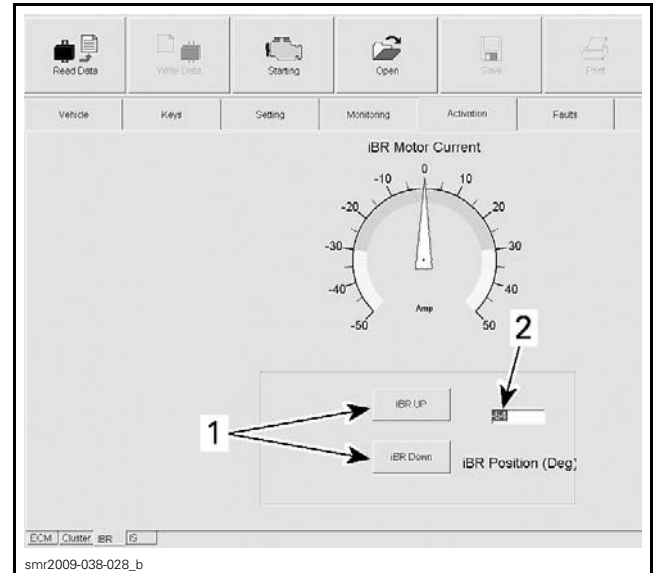
iBR Actuator Operation Test Using B.U.D.S.

1. Connect watercraft to the latest B.U.D.S. software, refer to *COMMUNICATION TOOLS AND B.U.D.S.*
2. Click the **Read Data** button.
3. Check for applicable fault codes on the **Faults** page.
4. Click the **Activation** tab.
5. In the lower LH corner, click the **iBR** tab.



TYPICAL
 1. Read Data
 2. Activation tab
 3. iBR tab

6. In B.U.D.S., click **iBR UP** and **iBR DOWN** buttons alternately and look for a change in **iBR Position (Deg)**.



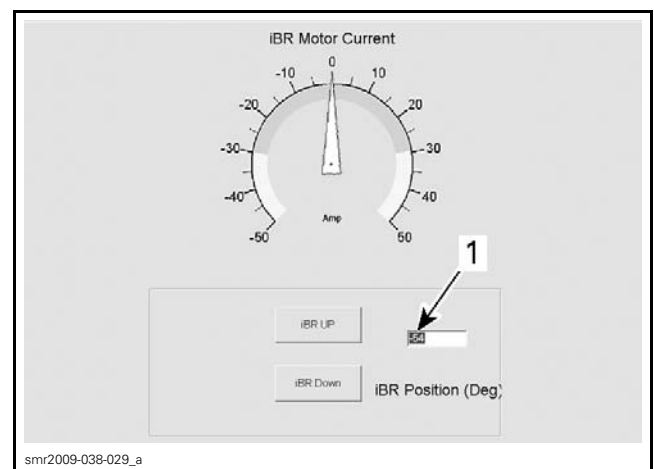
TYPICAL
 1. iBR UP/DOWN buttons
 2. iBR position indication

If the iBR moves using these buttons but does not move using the iBR lever, refer to *BRLS VOLTAGE TEST* in this subsection.

If the iBR does not move, check the iBR fuses (F5 and F17) in fuse box. If fuse are good, refer to *iBR ACTUATOR INPUT VOLTAGE TEST* in this subsection.

iBR Actuator Motor Current Test Using B.U.D.S.

1. On the iBR activation page in B.U.D.S., note the **iBR Position (Deg)** indication.



1. iBR position indication

2. Activate the iBR override function, refer to *iBR OVERRIDE FUNCTION* in the beginning of this subsection.

Subsection XX (iBR AND VTS)

3. Press and hold the VTS UP button on the LH handlebar to position the iBR to the full up position and look for the **iBR Motor Current** indication in B.U.D.S. Also look for a change of **iBR Position (Deg)** indication.

NOTE: Current draw indication will not be stable. High and low peaks will be observed. Look for the maximum average current draw.

iBR ACTUATOR CURRENT DRAW	
DOWN SELECTION	-5 to -15 A
UP SELECTION	+10 to +20 A

If current draw is abnormally high (between 20 and 30 A), check the following:

- Ensure iBR gate is free of debris.
- Remove the screws retaining the U-arm to the actuator shaft. Check for excessive friction in gate movement.
- Check iBR gate friction sleeves and bushings.
- Check for proper voltage to the iBR motor, see *iBR MOTOR VOLTAGE TEST* in this subsection.
- Check for fault codes using B.U.D.S.

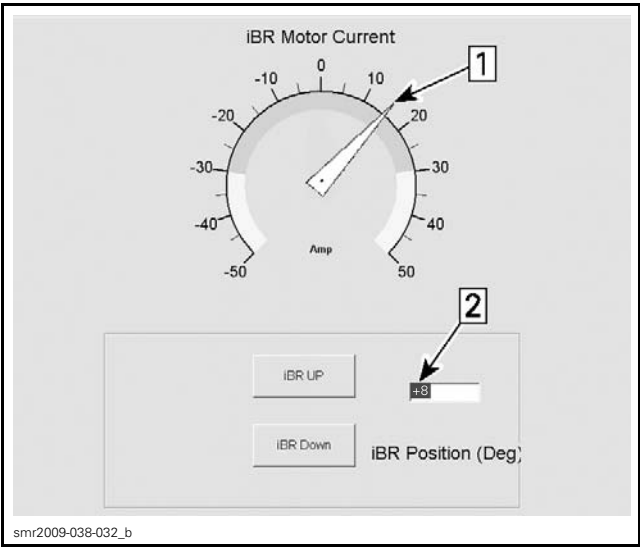
Remove debris, replace iBR gate components, or replace the iBR actuator as applicable.

iBR Actuator Connectors Access

GTS, GTI Series, GTR and WAKE Models

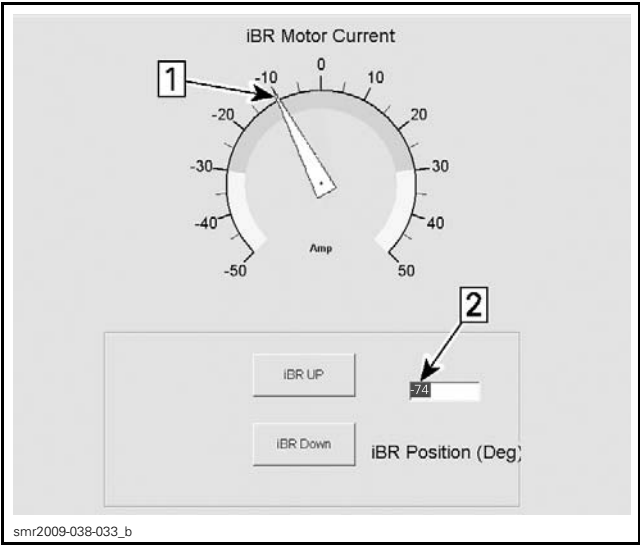
Remove seat.

Locate iBR actuator connectors.

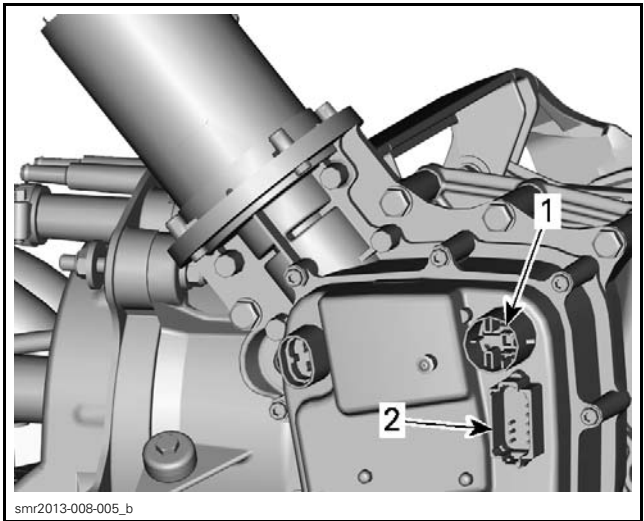


Step 1: Note iBR current draw
Step 2: Note iBR position indication change

4. Press and hold the VTS DOWN button and look for the **iBR Motor Current** draw indication. Also look for a change of **iBR Position (Deg)** indication.



Step 1: Note iBR current draw
Step 2: Note iBR position indication change

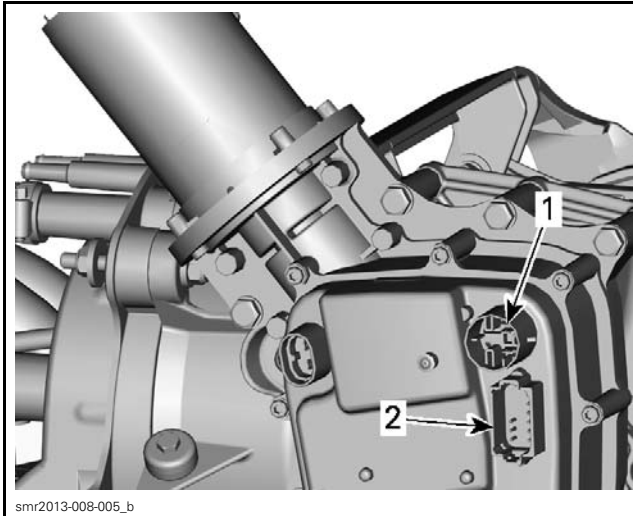


TYPICAL
1. 3-pin connector
2. 12-pin connector

RXP-X Series

Remove iBR ACTUATOR from hull. See procedure in this subsection.

Locate iBR actuator connectors.

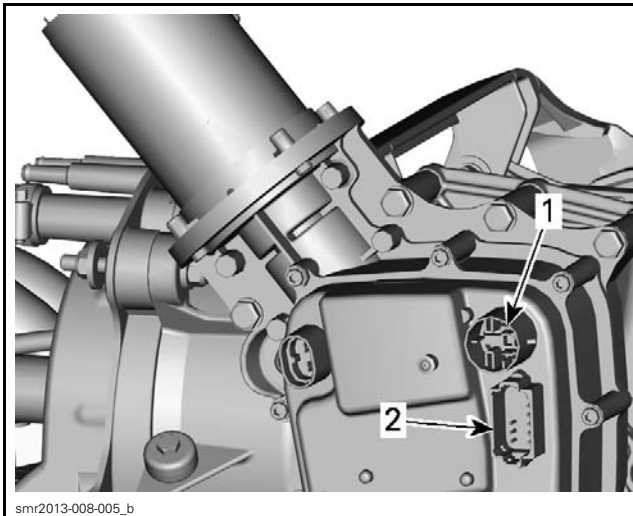


TYPICAL
1. 3-pin connector
2. 12-pin connector

GTX/RXT Series without Suspension and Wake Pro

Open LH access panel.

Locate iBR actuator connectors.



TYPICAL
1. 3-pin connector
2. 12-pin connector

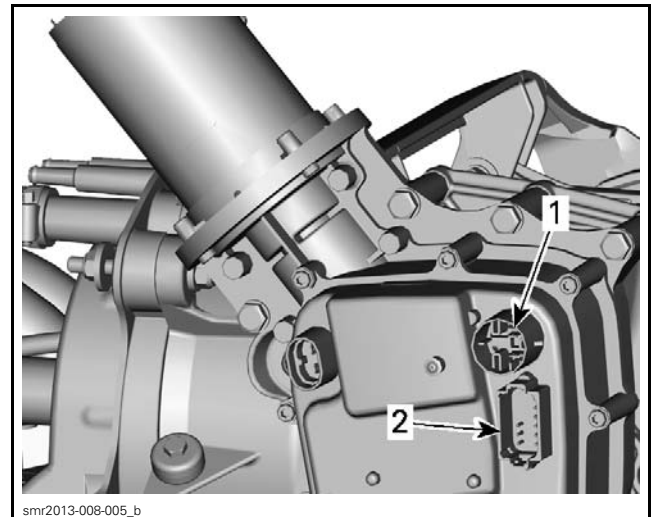
GTX/RXT Series with Suspension

Open the boarding platform and remove the LH storage bin.



smo2009-002-127_b
Step 1: Open the boarding platform
Step 2: Remove the LH storage bin

Locate iBR actuator connectors.

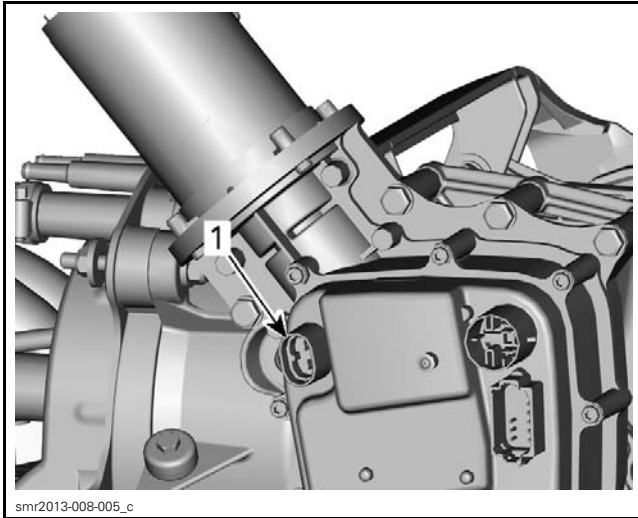


TYPICAL
1. 3-pin connector
2. 12-pin connector

iBR Motor Voltage Test

1. Disconnect the 2-pin connector on iBR module. Refer to *IBR ACTUATOR CONNECTORS ACCESS* in this subsection.

Subsection XX (iBR AND VTS)



TYPICAL

1. iBR motor module connector
2. Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to Vdc selection.
3. Install insulated clips on the multimeter leads and clip leads to pins in the motor connector on the iBR module.



TEST OF iBR MODULE OUTPUT VDC TO iBR MOTOR

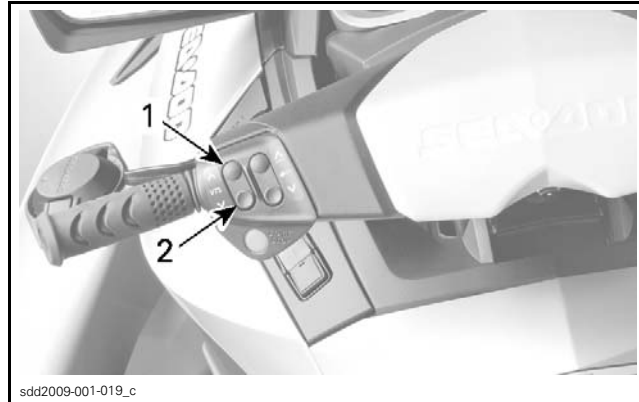
GTI Series, GTR, Wake and RXP X Series

Temporary install test wires with a connector to the motor connector on the iBR module. Measure voltage on test wires.

All Models

4. Using the iBR override function (see *SYSTEM DESCRIPTION (iBR)* in this subsection), press the VTS UP button and read the iBR module motor output voltage.

NOTE: The iBR UP button on the iBR Activation page in B.U.D.S. may be used instead of the iBR override function.



1. VTS UP
2. VTS DOWN

NOTE: Briefly press the START/STOP button to reactivate the electrical system when required.

5. Press the VTS DOWN button and read the iBR module motor output voltage.

NOTE: The iBR DOWN button on the iBR Activation page in B.U.D.S. may be used instead of the iBR override function.

iBR MOTOR VOLTAGE TEST

Battery voltage (over 12 Vdc)

NOTE: Voltage measured should be battery voltage in both UP or DOWN directions. Voltage polarity should reverse as UP or DOWN button is pressed alternately.

- If battery voltage **is not measured**, refer to *iBR ACTUATOR INPUT VOLTAGE TEST* in this subsection.
- If battery voltage **is measured** in both directions, refer to *iBR POWER TEST USING A TEST LIGHT* in this subsection.
- If battery voltage **is measured** and the test light is **bright** for both iBR UP or DOWN selections, the iBR motor is at fault and the iBR actuator must be replaced.
- If battery voltage **is low** or test light is **dim** in **both** directions, refer to *iBR ACTUATOR INPUT VOLTAGE TEST* in this subsection.
- If battery voltage **is measured** and test light is **dim** in **one** direction, replace the iBR actuator.

iBR Power Test Using a Test Light

1. Connect the clip of a 12 Vdc test light to the battery ground (or engine ground).
2. Touch the test light probe to each pin of the motor output connector on the iBR module as you select the iBR UP and DOWN alternately.

The test light should come on bright for one pin only in each direction.

NOTE: The 12 Vdc and ground will alternate between pins with a change of iBR direction.

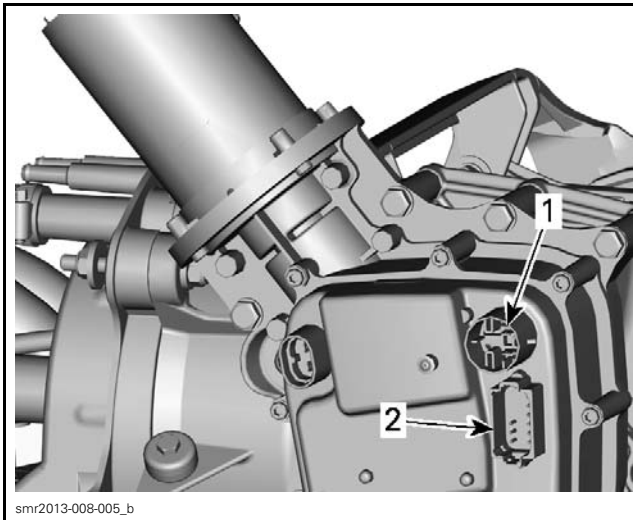
iBR Actuator Input Voltage Test

RXP X Series

Detach iBR actuator from hull. Refer to *IBR ACTUATOR REMOVAL* in this subsection.

All Models

1. Disconnect the 3-pin and 12-pin connectors from the iBR module. refer to *IBR ACTUATOR REMOVAL* in this subsection.



TYPICAL

1. 3-pin connector
2. 12-pin connector

2. Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to Vdc selection.
3. Measure for the battery input voltage (through fuse F5) to the iBR actuator as per following table.

iBR ACTUATOR INPUT VOLTAGE TEST (30 AMP BATTERY POWER)			
3 PIN CONNECTOR		BATTERY	READING
Pin 2	Pin 1	–	Battery voltage
Pin 2	–	Neg. (-) post	

NOTE: The 3-pin connector provides battery power directly to the iBR module for the actuator motor through the fuse F5.

If battery voltage is not measured, check the following:

- iBR fuse F5 in fuse box
- Battery voltage at fuse contact B4 of fuse box

- Wire continuity from pin 2 of iBR 3-pin connector to A4 of fuse box
- Jumper continuity fuse contact B4 to C3 of 12 Vdc bus-bar in fuse box.

If voltage is good to the negative battery post but not to pin 1 of the connector (ground wire to engine), check for an open or bad ground wire (loose, corroded, or pitted terminals, wire continuity, etc.)

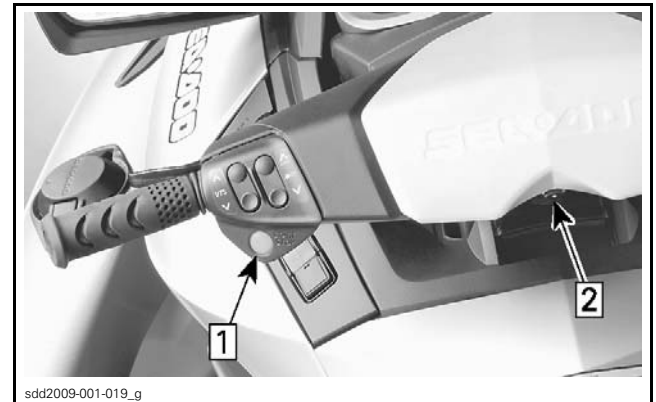
If battery voltage measured is as specified, carry out same test using a 12 Vdc test light. Test light should be bright.

If test light is not bright to pin 1 only, look for a bad contact on the ground circuit (loose, corroded, pitted, etc.).

If test light is not bright to the negative battery post, first check voltage at battery terminals to ensure battery is not discharged. If battery voltage is good, look for a bad contact in the 30 amp 12 V iBR power circuit (loose, corroded, pitted, etc.).

If the 30 amp 12 Vdc power to the iBR actuator is good, test for the switched 5 amp 12 Vdc as per following steps.

4. Briefly press the START/STOP button to wake the electrical system.



TYPICAL

- Step 1: Press START/STOP button
- Step 2: Install D.E.S.S. key

5. Measure for the switched input voltage to the iBR actuator as per following table.

iBR ACTUATOR INPUT VOLTAGE TEST (5 AMP SWITCHED)			
iBR CONNECTORS		BATTERY	READING
12 PIN	3 PIN		
Pin 1	Pin 1	-	Battery voltage
Pin 1	-	Neg. (-) post	

NOTE: The 12 pin connector provides BRLS signals, CAN bus, and a switched 12 Vdc power to the iBR module through the fuse F17

If battery voltage is not measured at all, check the following:

- iBR control (CTRL) fuse F17 in fuse box
- Battery voltage at fuse contact E3 of fuse box
- Wire continuity from pin 1 of iBR 12-pin connector to F3 of fuse box
- Jumper continuity fuse contact E3 to D3 of 12 Vdc accessory bus-bar in fuse box.

If voltage is good to the negative battery post but not to pin 1 of the connector (ground wire to engine), check for an open or bad ground wire (loose, corroded, or pitted terminals, wire continuity, etc.).

If battery voltage measured is as specified, carry out same test using a 12 Vdc test light. Test light should be bright.

If test light is not bright to pin 1 of the 3 pin connector, look for a bad contact on the ground circuit (loose, corroded, pitted, etc.).

If test light is not bright to battery negative terminal, first check voltage at battery terminals to ensure battery is not discharged. If battery voltage is good, look for a bad contact in the 12 V iBR switched power circuit (loose, corroded, pitted, etc.).

If the iBR actuator input voltages and ground circuit are good, and there is no CAN bus or BRLS fault, replace the iBR actuator.

iBR Actuator Removal

All Models

1. Move the iBR gate to the forward position (full up) using the *iBR OVERRIDE* function. Refer to *SYSTEM DESCRIPTION (iBR)* in this subsection.

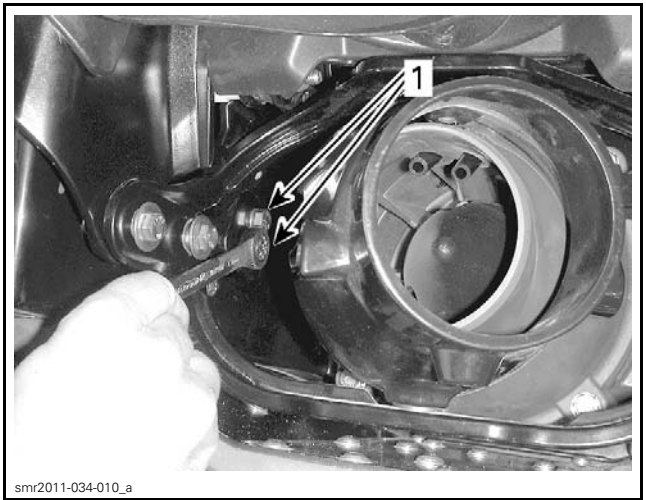
NOTICE Do not try to manually force the iBR gate when all components are installed.

CAUTION Remove iBR fuse (F5) before working in the iBR gate area. Refer to *POWER DISTRIBUTION*.

All Models

From Jet Pump Area

2. Remove and discard 2 bolts coupling iBR actuator to U-arm.



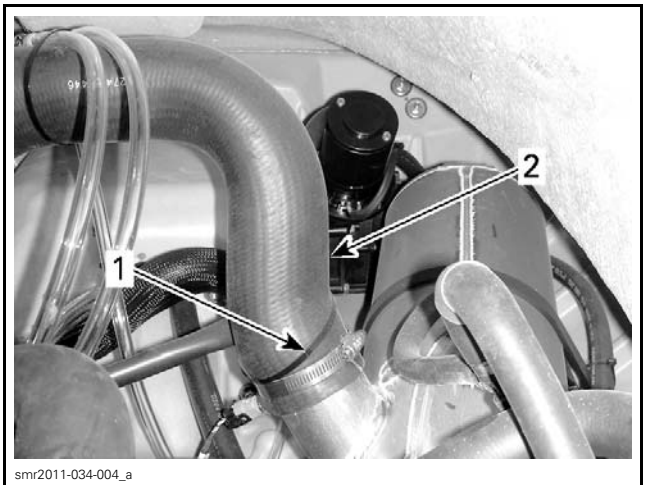
TYPICAL
1. Remove and discard screws

GTI Series, GTR, Wake and RXP-X

3. Remove seat.
4. Remove passenger handles. Refer to *BODY*.
5. Remove exhaust pipe. Refer to *EXHAUST SYSTEM* in 2012 shop manual.

From Inside Bilge

6. Cut locking tie.
7. Disconnect hose from muffler.
8. Move hose end away.



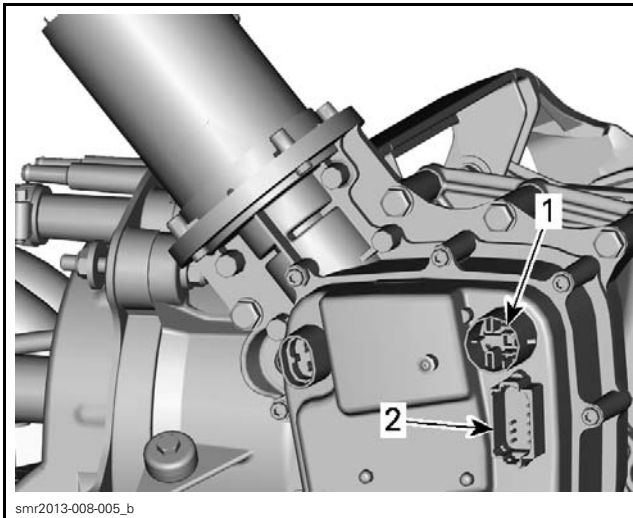
1. Cut locking tie
2. Disconnect hose

RXP-X

9. Remove muffler.

GTJ/RXT Series and Wake Pro Models

10. Disconnect the two aft electrical connectors from the iBR actuator. Refer to *iBR ACTUATOR CONNECTORS ACCESS* in this subsection.

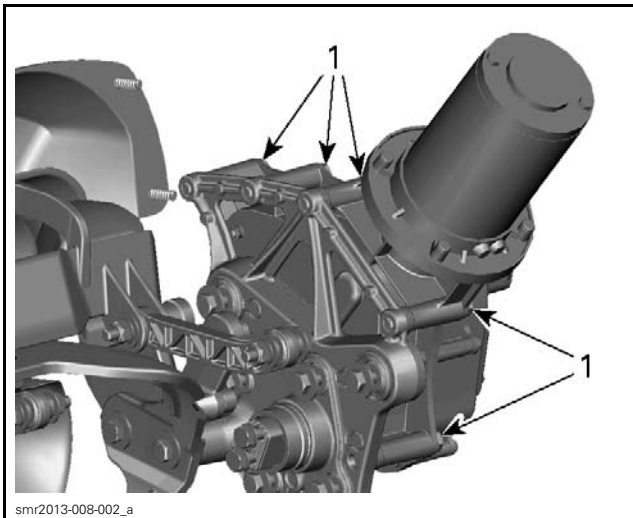


TYPICAL

1. iBR actuator 3 pin connector
2. iBR actuator 12 pin connector

All Models

11. Remove and discard iBR actuator retaining screws.



1. Remove and discard screws

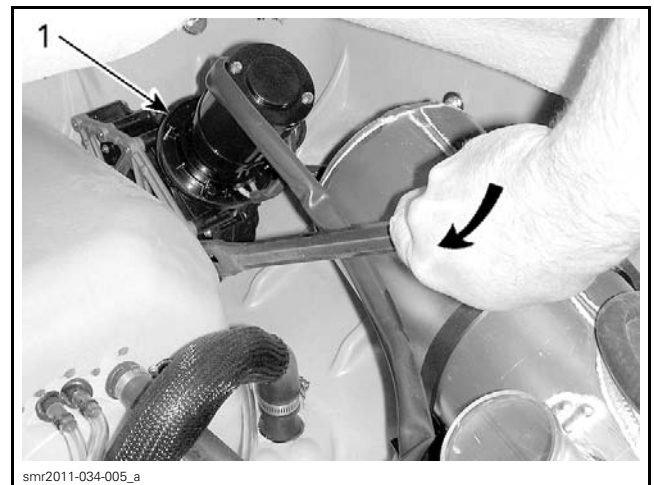
12. Pull out iBR actuator while leaving LH support plate in place.

NOTE: It is very important to leave support plate installed at its original position. Do not remove support plate mounting screws.



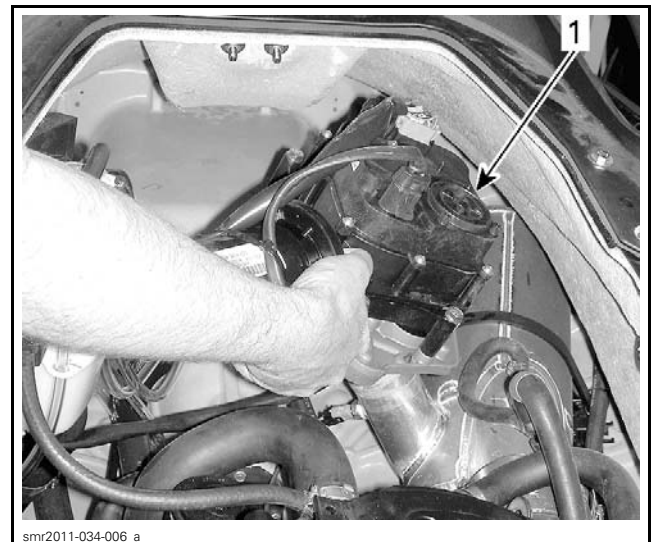
1. Do not remove these screws

NOTE: It may be necessary to pry out iBR actuator.



PRYING iBR ACTUATOR

1. iBR actuator



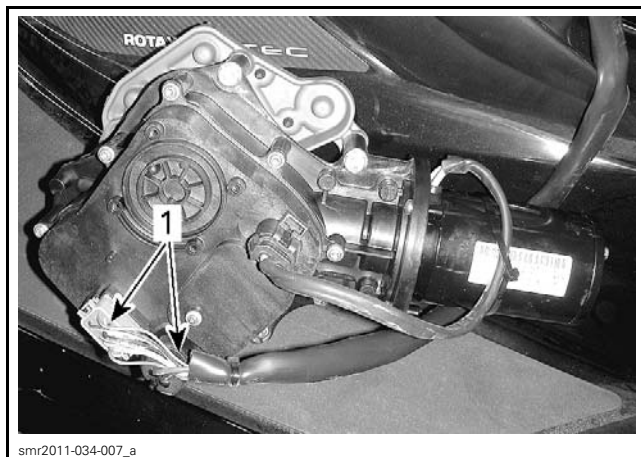
1. Pull out

13. Cut locking tie.

GTI Series, GTR, Wake and RXP-X

14. Disconnect the indicated connectors.

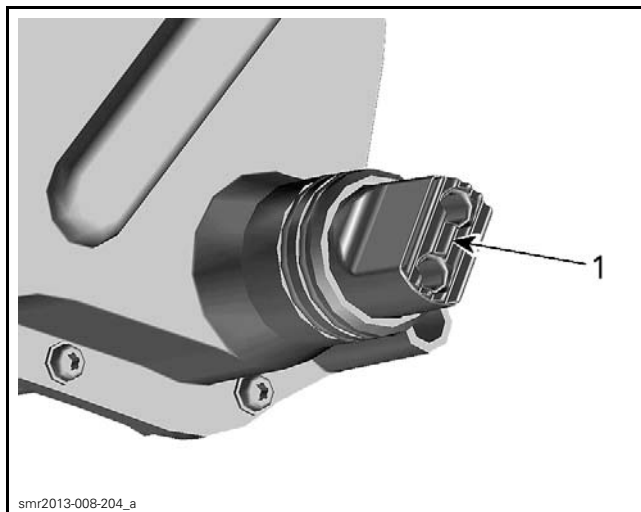
NOTE: Pull on the iBR actuator to access the connectors.



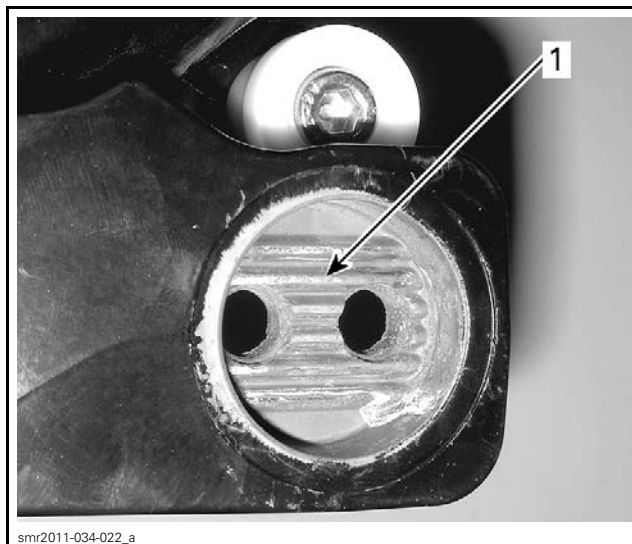
1. Unplug connectors

iBR Actuator Inspection

Check condition of ribs on actuator shaft end and in U-arm.



1. Actuator shaft ribs



1. U-arm ribs

Replace parts as necessary.

iBR Actuator Installation

Installation is the reverse of the removal procedure however, pay attention to the following.

Apply a small amount of DIELECTRIC GREASE (P/N 293 550 004) to the connector pins before plugging the connectors to the iBR actuator.

RXP-X, GTI Series, GTS and Wake

IMPORTANT: Connect connectors to iBR module before installing iBR actuator to support plate.

All Models

Install new screws with threadlocker (or clean actuator mounting screw threads and apply LOCTITE 243 (BLUE) (P/N 293 800 060) on threads).

Install actuator shaft through support plate. Installation is the reverse of removal. However pay attention to the following:

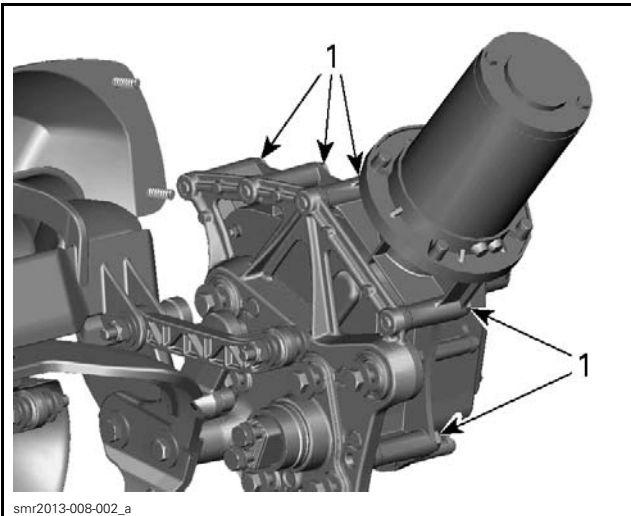
1. Loosely install all new actuator mounting screws to allow proper installation.

NOTE: Do not remove support plate mounting screws.

NOTE: It is very important to leave support plate installed at its original position. Do not remove support plate mounting screws.



1. Do not remove these screws



1. Retaining screws installed

2. Make sure iBR actuator shaft is fully pushed in place.
3. Tighten retaining screws to specifications.
4. Remainder of installation is the reverse of removal procedure. Install new fasteners when required.

TIGHTENING TORQUE
12 N•m (106 lbf•in)

Clean iBR shaft screw threads and install new screws with threadlocker.

Secure U-arm to iBR shaft.

Reinstall iBR fuse.

If installing a NEW iBR actuator, refer to *iBR ACTUATOR REPLACEMENT* in this subsection.

Check watercraft in water for water tightness.

iBR Actuator Replacement

To allow proper operation of a NEW iBR actuator, refer to *ECM, CLUSTER AND iBR UPDATES*.

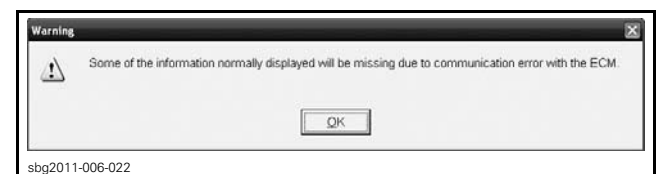
ECM, Cluster And iBR Updates

Four reflash operations (2 reflash on GTS models) will be done in the order given in the following table.

You will be automatically prompted to start the reflash operation after you click the Read Button within B.U.D.S.

MODULE	APPROXIMATE TIME FOR THE REFLASH
1. ECM	6 minutes
2. Cluster	30 seconds
3. iBR (not applicable to GTS models)	20 seconds
4. iBRMON (not applicable to GTS models)	20 seconds
Total time	7 minutes

After each module reflash, the module will be automatically re-read by B.U.D.S. If the following message appears at this moment, do the following:



1. Press the watercraft START button.
2. In B.U.D.S., click "OK" in the message box.
3. You can normally continue the update process.

IMPORTANT: In case of problem updating a module, please contact the BRP technical support team.

The keys already programmed should remain programmed after the updates.

NOTICE

Continuous power to the computer and to the watercraft is mandatory during this operation.

Be sure to disable the computer screen saver.

If using a portable computer, be sure to provide a continuous supply of electrical power by connecting it to a wall outlet.

These software updates of the watercraft modules will take some time to complete and **MUST NOT** be interrupted or damage to a module could occur.

Although computer screen may go blank or may seem to freeze for a while, do **NOT** interrupt B.U.D.S. to allow updates to be completed.

1. Ensure the watercraft battery is fully charged.

2. Connect a portable power pack (fully charged) to the watercraft battery to ensure there is enough power to complete the software updates. The use of the portable power pack is required to avoid potential communication problems during the update.

NOTICE

NEVER use a battery charger instead of portable power pack. The battery charger may cause electrical noise causing many problems during the update.

3. Make sure to use the proper B.U.D.S. version.

REQUIRED B.U.D.S. VERSION
W3.3.3 or higher

4. Connect MPI before starting B.U.D.S. to ensure proper operation. Refer to *2011 SHOP MANUAL* for details:

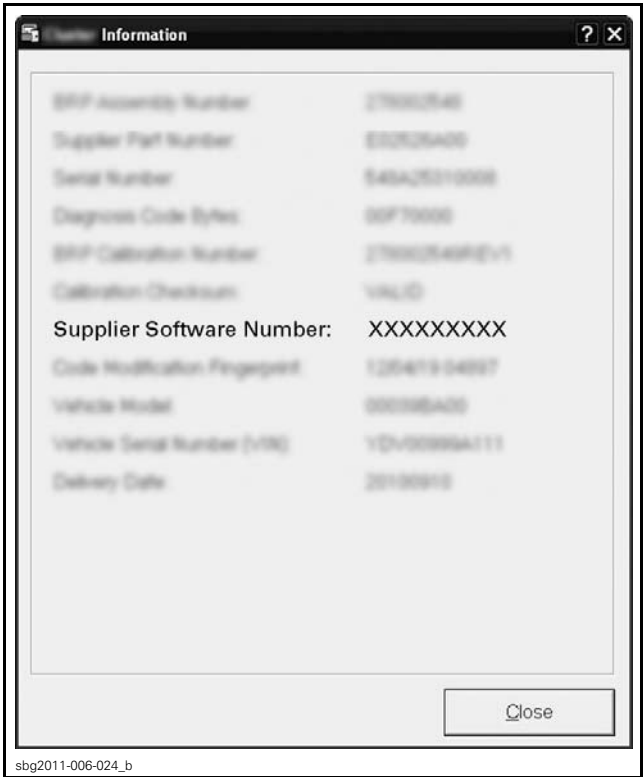
– Section 03: *ELECTRONIC MANAGEMENT SYSTEMS*

– Subsection 04: *COMMUNICATION TOOLS AND B.U.D.S.*
5. Push the START button briefly.

6. Install tether cord on engine cut-off switch.

7. Start B.U.D.S. and logon.
- NOTE:

If the following message does not automatically vanish, click the button: **Try active detection mode.**
-
- Three modules (2 for GTS) should appear as connected in B.U.D.S.
-
- TYPICAL
8. Click on **Read Data**.
-
9. When the following message appears, click **Yes** to start the updates.
-
- TYPICAL
- 28
- smr2012-035



CLUSTER INFORMATION	
INFORMATION ITEM	VALUE
Supplier Software Number	S01300D00 OR S01299D01

24. If any number in the table is found in B.U.D.S., then the update was successful.
25. Select the **Module** drop down list and select **iBR** then **Information**.
26. Look at the "Supplier Software Number".

iBR INFORMATION	
INFORMATION ITEM	VALUE
Supplier Software Number	S01315A07

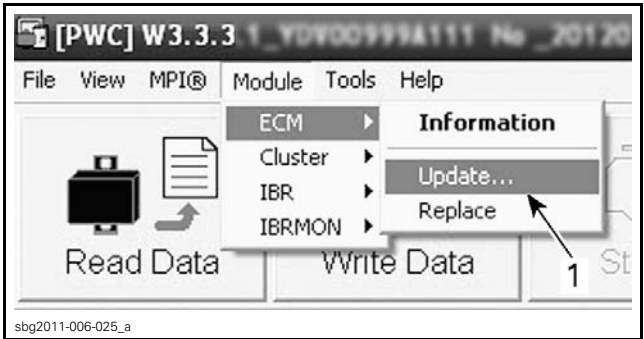
27. If the number in the table is found in B.U.D.S., then the update was successful.
28. Select the **Module** drop down list and select **iBRMON** then **Information**.

NOTE: Both the iBR and the iBRMON must be reflashed during the same update session otherwise the iBR will not operate at all.

29. Look at the "Supplier Software Number".

iBRMON INFORMATION	
INFORMATION ITEM	VALUE
Supplier Software Number	S01317A02

30. If the number in the table is found in B.U.D.S., then the update was successful.
31. If the update was not successful for any module, check for each non-reflashed module if an update is available in B.U.D.S.
32. For example, select the **Module** drop down list and select **ECM** then **Update**.
- 32.1 If an update is available, apply it.
- 32.2 If no update is available, please contact the BRP technical support team.



EXAMPLE
1. ECM update available

iBR GATE

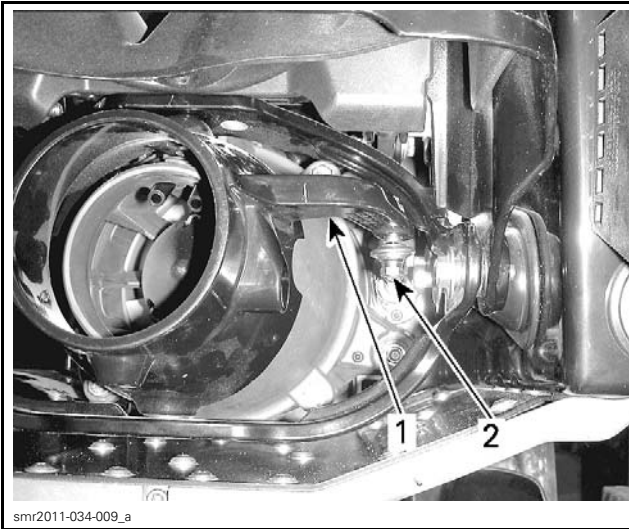
iBR Gate Removal (with VTS Trim Ring and Steering Nozzle)

Move the iBR gate to the forward position (full up) using the *iBR OVERRIDE* function. Refer to *SYSTEM DESCRIPTION (iBR)* in this subsection.

NOTICE Do not try to manually force the iBR gate when all components are installed.

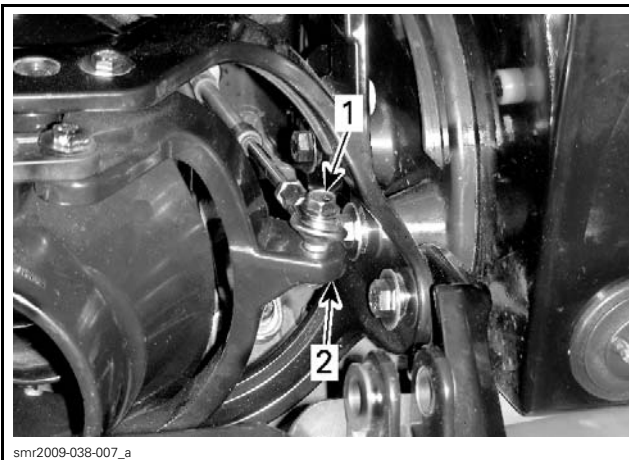
CAUTION Remove iBR fuse (F5) before working in the iBR gate area. Refer to *POWER DISTRIBUTION*.

1. Disconnect the steering cable from the steering nozzle arm.



GTI SERIES, GTR AND WAKE MODELS

1. Nozzle arm
2. Remove screw



GTX/ RXT/RXP-X SERIES, WAKE PRO MODELS

1. Remove screw
2. Nozzle lever

2. Remove and discard screws retaining U-arm to iBR actuator shaft.



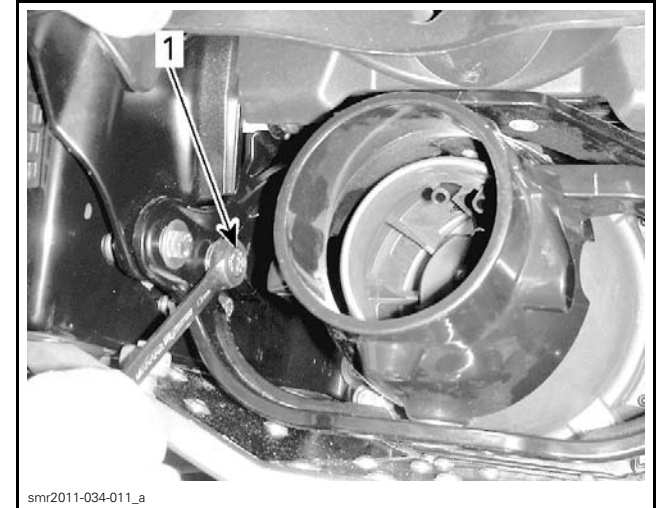
TYPICAL

1. Remove and discard screws

CAUTION From now on, retain iBR gate to prevent it to fall. Pay attention not to catch your fingers.

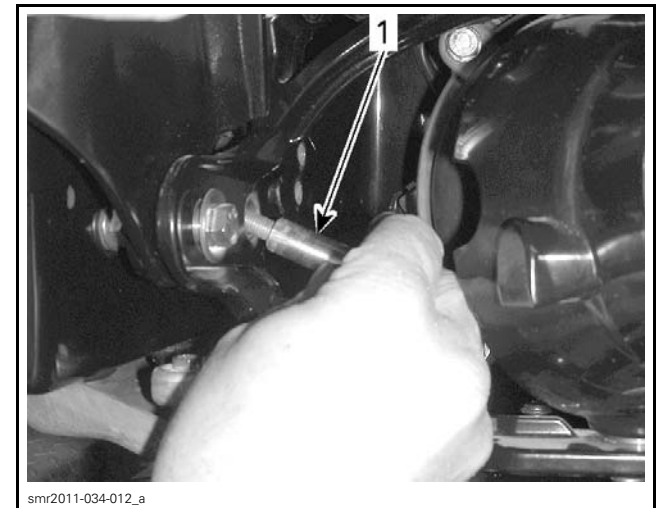
3. Raise iBR gate to its upper position. Hold in position.
4. Remove and discard screw and keep bushing from iBR gate LH pivot point.

NOTE: Pull out bushing along with the screw.



TYPICAL — LH SIDE

1. Remove and discard screw, keep bushing

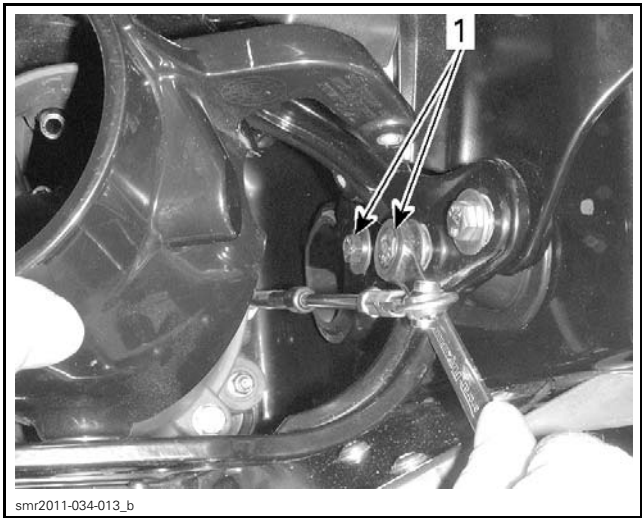


TYPICAL

1. Bushing

5. Remove and discard screw and keep bushing from iBR gate RH pivot point.
6. Remove and discard screw and keep bushing from U-arm pivot point

NOTE: Pull out bushing along with the screw.



TYPICAL — RH SIDE
1. Remove and discard screws, keep bushings

Pull out iBR gate ass'y with U-arm.

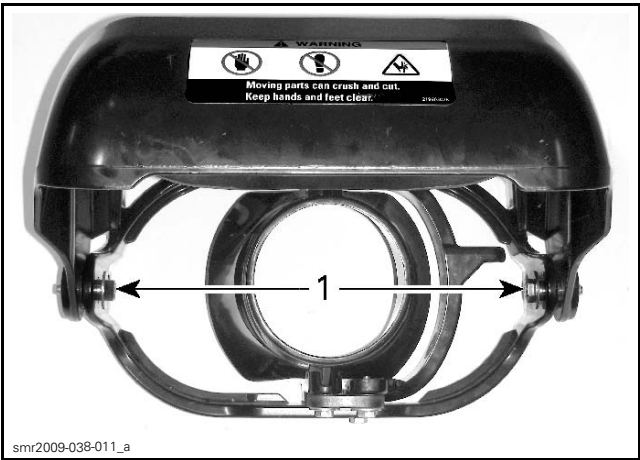


TYPICAL

iBR Gate and VTS Trim Ring Disassembly

VTS Trim Ring Removal

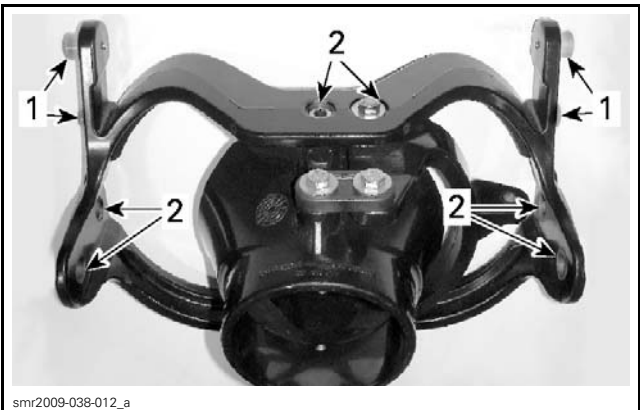
Remove and discard the two hexagonal screws and keep bushings securing the iBR gate to the VTS trim ring.



TYPICAL
1. iBR gate retaining hexagonal screws to remove

Trim Ring Inspection

- 1. Inspect trim ring and metal spacers for cracks, oblong holes, evidence of wear and deformation.
- 2. Inspect plastic bushings and friction sleeves for cracks, deformation and signs of wear.



TYPICAL VTS TRIM RING (WITH NOZZLE AND STEERING ARM)
1. Friction sleeves (2 each side)
2. Plastic bushings (x8)

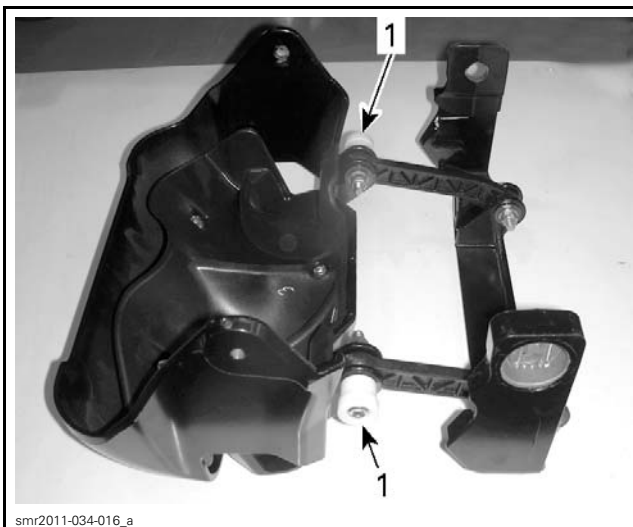


TYPICAL - WORN AND DEFORMED PLASTIC BUSHING



NOTE: Friction sleeves should be replaced as specified in maintenance chart or if they show signs of wear (flat surfaces). Plastic bushings are press fit and should be replaced if they show signs of wear, deformation, or if the iBR gate backlash is beyond service limit.

3. Inspect gate stoppers for signs of wear.



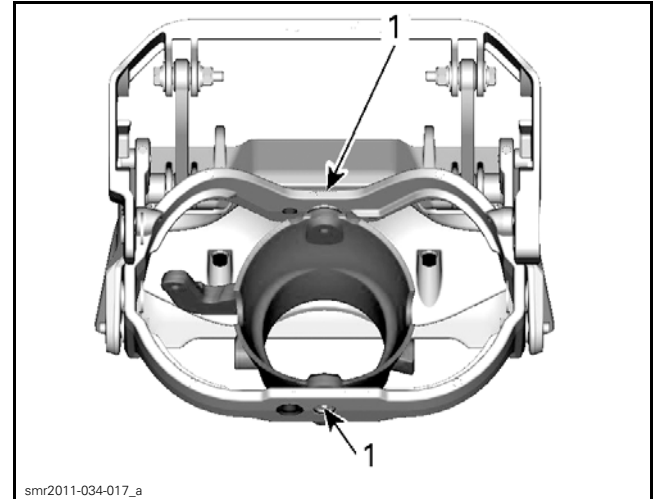
TYPICAL
1. Stoppers

4. Replace parts as required.

Steering Nozzle Removal

GTI Series, GTR and Wake Models

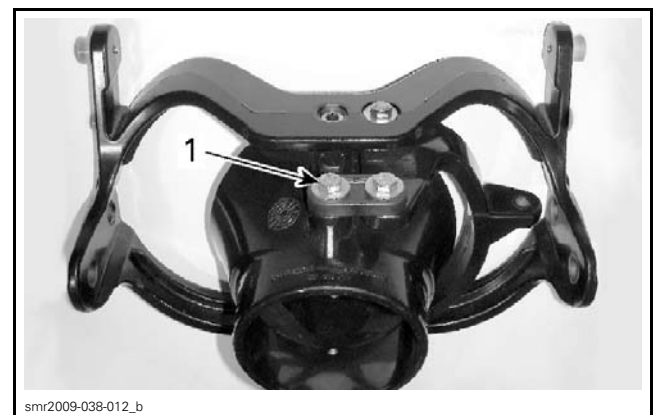
1. Remove screws securing nozzle to VTS ring.



1. Remove screws

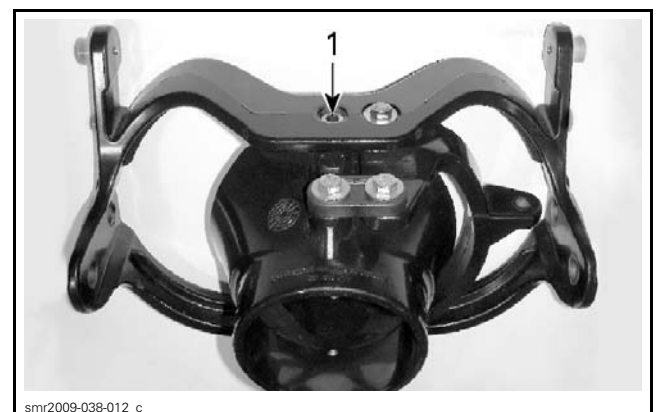
GTX/RXT/RXP-X Series and Wake Pro Models

1. Remove the 2 hexagonal screws securing the steering arms (links) to the steering nozzle (top and bottom).



1. Hexagonal screws to remove (top and bottom)

2. Remove the 2 socket head screws securing the nozzle to the VTS trim ring (1 top and 1 bottom).



1. Socket head screws to remove (top and bottom)

Steering Nozzle Lever Removal

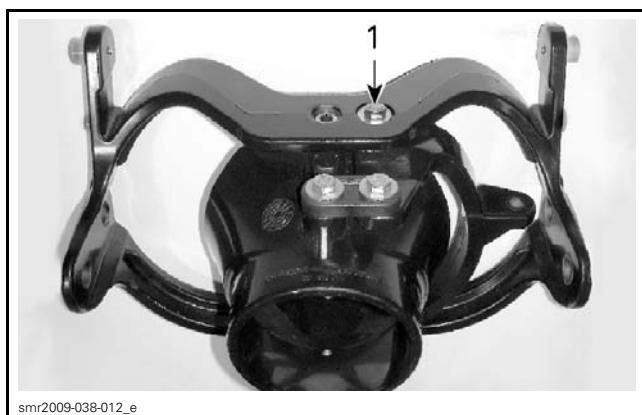
GTX/RXT/RXP-X Series and Wake Pro Models

1. Remove the hexagonal screws securing the steering arms (links) to the steering nozzle lever, top and bottom.



1. Hexagonal screws to remove (top and bottom)

2. Remove the hexagonal screws securing the steering nozzle lever to the VTS trim ring, top and bottom.



1. Hexagonal screws to remove (top and bottom)

Steering Nozzle Inspection

1. Inspect steering nozzle for cracks, wear, deformation, and other damages.

Inspect bushings for wear or other damage.

2. Replace parts as required.

Steering Nozzle Lever Inspection

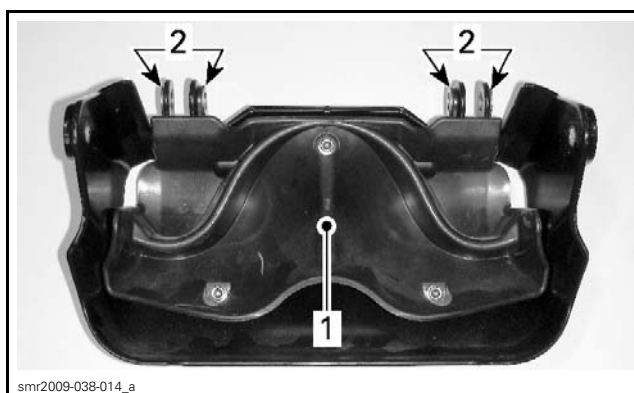
GTX/RXT/RXP-X Series and Wake Pro Models

1. Inspect steering nozzle lever, steering arms, and spacers for cracks, elongated holes, evidence of wear, deformation and other damages.

2. Replace as required.

iBR Gate Inspection

1. Inspect the iBR gate and its plastic liner for cracks, out of round holes, evidence of wear, deformation and other damages.
2. Inspect plastic bushings (x4) for cracks, wear, and deformation.
3. Replace as required.



1. Plastic liner
2. Plastic bushings

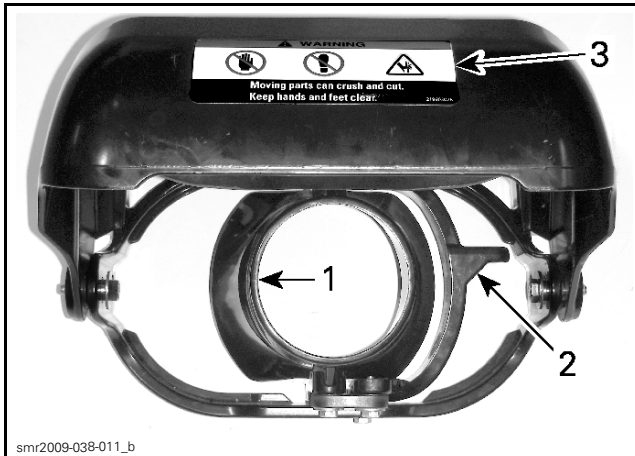
iBR Gate and VTS Ring Reassembly

Install all parts removed in the reverse order of removal, however pay attention to the following:

- Install new friction sleeves (as required).
- Install new plastic bushings (as required).
- Install new hexagonal screws with thread-locker.
- Torque all retaining screws as per exploded view.

When installing the iBR gate onto the VTS ring, position the VTS ring so that the small end of the steering nozzle is facing you with the steering lever towards the RH side.

Position the iBR gate over the ring so that the warning label is facing you (right side up) and install the mounting hardware as seen in the exploded view. The attachment points for the linkage arms will be facing away from you (not visible in following illustration of iBR gate and VTS ring assembly).



1. Small end of nozzle
2. Steering lever
3. Warning label

iBR Gate Installation (with VTS Trim Ring and Steering Nozzle)

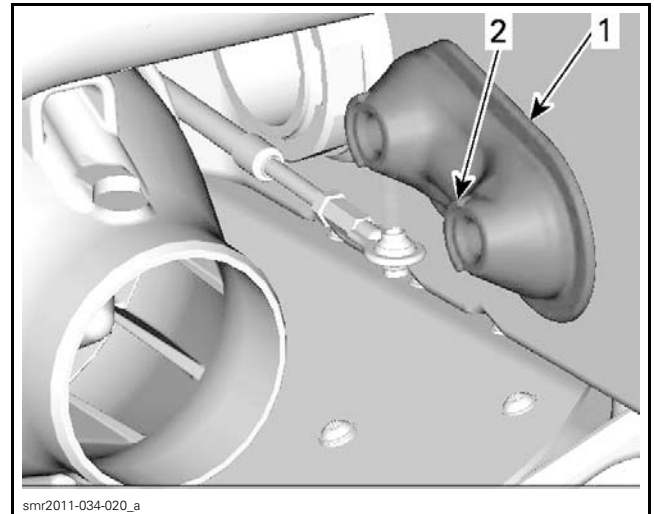
Installation is the reverse of the removal procedure however, pay attention to the following.

Ensure all flanged bushings are in place.

Position iBR gate down and components as shown to install into position.



Insert iBR gate ass'y between mounting plates.

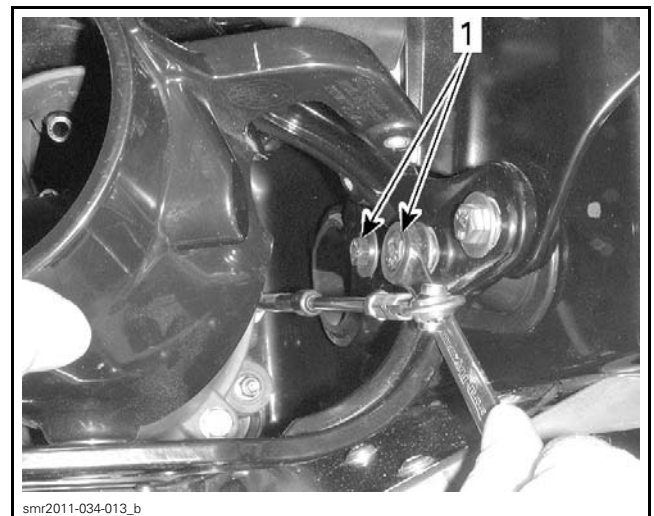


1. RH mounting plate
2. Rib here

NOTE: Ensure RH mounting plate is in place before inserting iBR gate ass'y. Also position its ribs as illustrated.

Raise iBR gate to its upper position. Hold in position.

Use new screws with threadlocker for installation. Loosely install M8 x 70 mm screws on RH side.



1. M8 x 70 screws here

Install screw on LH side of VTS ring pivot point then iBR shaft screws.

Torque all retaining screws as specified in exploded view.

NOTICE Over torquing will damage inserts.

NOTICE Overtorquing will damage inserts.

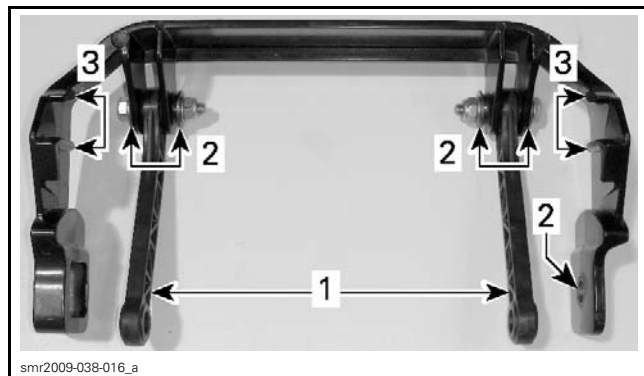
U-ARM

U-Arm Removal

Remove U-arm as an assembly with iBR gate. Refer to *iBR GATE* in this subsection.

U-Arm Inspection

1. Inspect U-arm and linkage arms (x2) for cracks, wear, and signs of twisting and bending.
2. Ensure the VTS cams on the U-arm are not worn, cracked or broken.
3. Inspect the plastic bushings (x5) for cracks, wear and deformation.
4. Replace parts as required.



- smr2009-038-016_a
1. Linkage arms
 2. Plastic bushings (x5)
 3. VTS cams

U-Arm Installation

Installation is the reverse of the removal procedure however, pay attention to the following:

- Install new plastic bushings (as required).
- Install all new hexagonal screws with thread-locker.
- Torque all retaining screws as per exploded view.

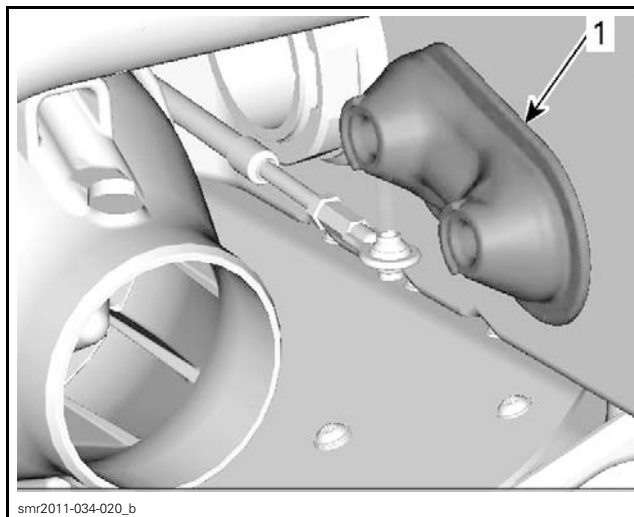
iBR GATE SUPPORT PLATES

iBR Gate Support Plate Removal

NOTE: Support plates have been factory aligned with precision to ensure proper iBR mechanism alignment. It is not recommended to remove the support plates except for 2 specific reasons: Damage to the support plate or Realignment required. In both cases refer to *iBR MECHANISM ALIGNMENT VERIFICATION*.

RH Support Plate Removal

1. Remove iBR gate ass'y. Refer to procedure in this subsection.
2. Remove exterior support plate (unsnap).



smr2011-034-020_b

1. RH support plate

3. Remove plastic nut.
4. Remove internal support plate.
5. Check condition of support plate gasket. Replace if necessary.

LH Support Plate Removal

1. Remove iBR actuator from support plate. Refer to procedure in this subsection.
2. Remove and discard support plate mounting screws.



smr2011-034-003_a

1. Support plate mounting screws

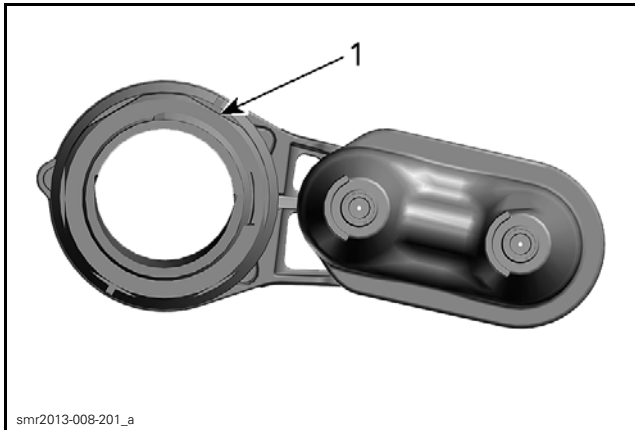
3. Pull out support plate.
4. Check condition of support plate gasket. Replace if necessary.

iBR Support Plate Installation

RH Support Plate Installation

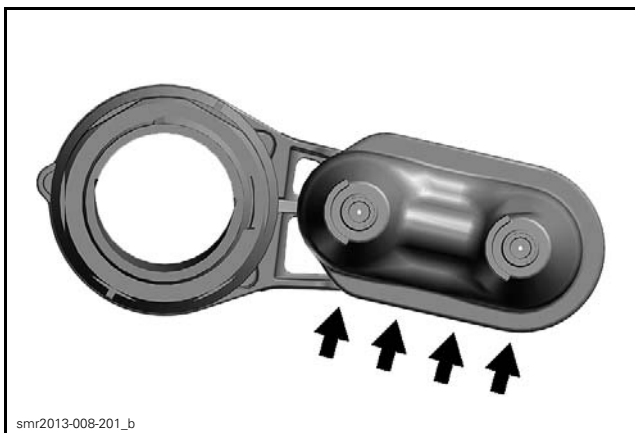
1. Install inner plate, gasket and outer RH support plate and snap them together.

2. Finger tighten plastic nut



1. Plastic nut

3. Push the assembly towards the top of the through-hull holes as much as possible.



PUSH UPWARDS

TIGHTENING TORQUE	
Plastic Nut	28 N•m (21 lbf•ft)

NOTE: It is normal that the assembly might slightly move downwards when tightening the plastic nut. Ensure to prevent larger undesired movement.

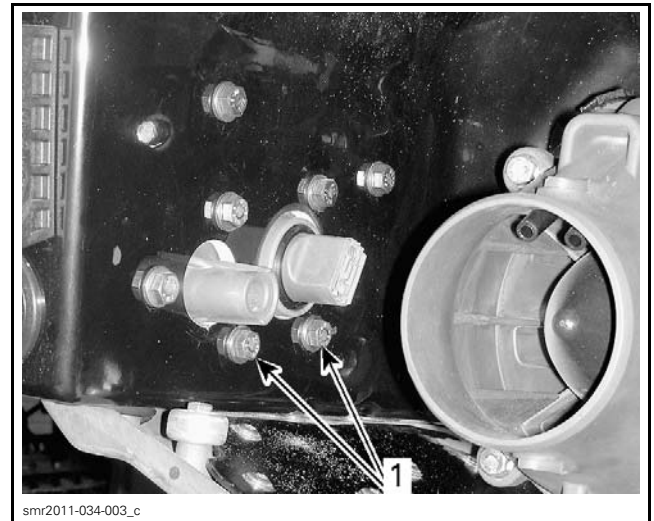
4. Ensure formed seal is in good condition and properly installed onto support plate.
5. Verify alignment. Refer to *iBR MECHANISM ALIGNMENT VERIFICATION* in this subsection.
6. Check watercraft in water for water tightness.

LH Support Plate Installation

Installation is the reverse of the removal procedure however, pay attention to the following: To avoid iBR position fault code, strictly follow this installation sequence:

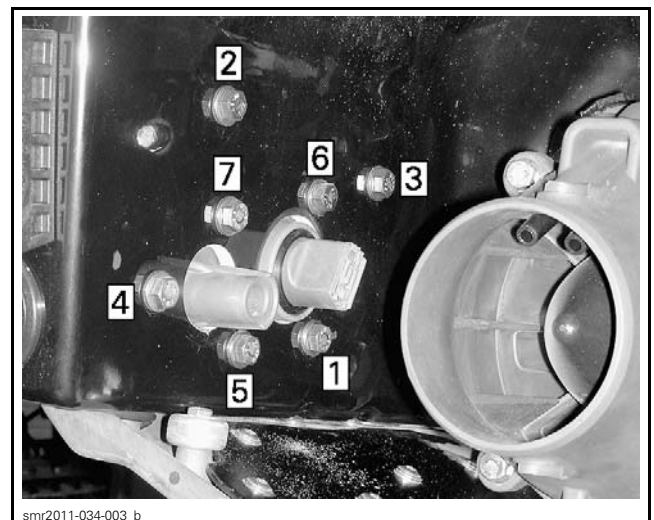
1. Install iBR actuator on the support plate.

2. Install gate assembly, except for the 2 bolts securing the iBR actuator shaft to U-arm.
3. Loosely install all actuator mounting screws.
4. Lower reverse gate until it bottoms against stoppers.
5. Tighten the two lower screws shown.



1. Tighten first

6. Raise reverse gate.
7. Tighten remaining screws.
8. Finally, torque actuator mounting screws to specification as per following sequence.



iBR ACTUATOR SCREW TIGHTENING SEQUENCE

9. Install screws to secure support plate to iBR actuator and torque as per exploded view.
10. Ensure formed seal is in good condition and properly installed onto support plate.

Subsection XX (iBR AND VTS)

11. Verify alignment. Refer to *iBR MECHANISM ALIGNMENT VERIFICATION* in this subsection.

12. Check watercraft in water for water tightness.

iBR Mechanism Alignment Verification

NOTE: Before proceeding with the alignment verification, make sure that:

- iBR actuator is installed. Refer to *iBR ACTUATOR INSTALLATION*.

- iBR gate assembly is installed. Refer to *iBR GATE INSTALLATION*.

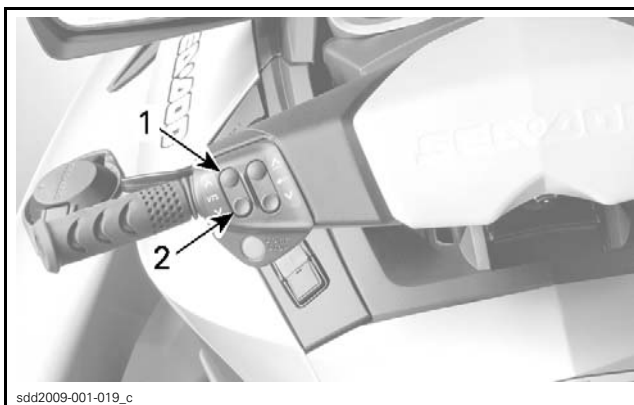
- 2 bolts that attach U-arm to iBR actuator are removed.

- all parts from the iBR, and iBR gate assembly- have no damage or excessive wear.

STEP	NORMAL SITUATION	VERIFICATION	IF VERIFICATION FAILS
1	When stroking the mechanism downwards, the trim ring bottoms against the pump (VTS down). Then the trim ring is locked and only the U-arm and reverse gate rotate.	Raise the reverse gate completely. Rotate the reverse gate down slowly and check the trim ring's stroke. It should complete its stroke with no resistance.	Check if the pump and venturi are properly tightened or if they are damaged. Inspect parts for damage or excessive wear.
2	The reverse gate must be able to rotate completely down under its own weight.	Raise the reverse gate completely and let it rotate under its own weight. It should rotate all the way down.	Check the mechanism's alignment with STEPS 3 and 4.
3	The steering nozzle must turn freely at all times, even when trim ring bottoms against the pump (VTS down).	Turn by hand the steering nozzle both sides various times during the rotation of the mechanism. It should turn freely at any angle.	Inspect parts for damage or excessive wear. If it is still not free, move both fixing plates slightly towards the top and rear of PWC.
4	When stroking the mechanism downwards, the trim ring's friction sleeves should not prevent the U-arm from completing its rotation.	Raise the reverse gate completely. Rotate the reverse gate down slowly and check the U-arm's stroke. It should complete its rotation.	There is a misalignment issue, use a feeler gauge to determine which sleeve is preventing movement, then proceed with STEPS 4a to 4d. accordingly.

STEP	NORMAL SITUATION	VERIFICATION	IF VERIFICATION FAILS
4a	The bottom of the LH friction sleeves must not prevent rotation by contacting the U-arm.	Raise the reverse gate completely. Rotate the reverse gate down slowly and check if there is a contact between the LH friction sleeves and the U-arm that prevents rotation.	Refer to <i>LH PLATE REMOVAL</i> and <i>LH PLATE INSTALLATION</i> . Raise the LH plate's rear pivot. Lower the LH plate's front pivot. 
4b	The top of the LH friction sleeves must not prevent rotation by contacting the U-arm.		Refer to <i>LH PLATE REMOVAL</i> and <i>LH PLATE INSTALLATION</i> . Lower the LH plate's rear pivot. Raise the LH plate's front pivot. 
4c	The bottom of the RH friction sleeves must not prevent rotation by contacting the U-arm.	Raise the reverse gate completely. Rotate the reverse gate down slowly and check if there is a contact between the RH friction sleeves and the U-arm that prevents rotation.	Refer to <i>RH PLATE REMOVAL</i> and <i>RH PLATE INSTALLATION</i> . Raise the RH plate's rear pivot. Lower the RH plate's front pivot. 
4d	The top of the RH friction sleeves must not prevent rotation by contacting the U-arm.		Refer to <i>RH PLATE REMOVAL</i> and <i>RH PLATE INSTALLATION</i> . Lower the RH plate's rear pivot. Raise the RH plate's front pivot. 

VTS CONTROL BUTTON



1. VTS up button
2. VTS down button

VTS Button Overview

The VTS button contain a series of 4 diodes for the UP and DOWN arrow switches. Refer to *WIRING DIAGRAM*.

The center wire to the switches (pin "C"), is common for iS button and VTS button (somewhat like a ground wire). The other two wires (pins "A" and "B"), act as signal wires to the gauge for each set of switches. They actually each form one branch of an electronic circuit within the gauge.

Each diode (in circuit) drops a nominal 0.6 Vdc when conducting electricity. If the circuit current passes through all four diodes (say VTS switch open), a drop of 2.4 Vdc would be measured across the 4 diodes (pin "A" to pin "C"). This drop of 2.4 Vdc measured at pin "A" tells the gauge the VTS switch is open.

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If the VTS UP button is pressed, 2 diodes are bypassed by the closed switch. The remaining two diodes in the circuit drop 1.2 Vdc (at pin "A").

If the VTS DOWN button is pressed, 1 diode is bypassed by the closed switch. The remaining three diodes in the circuit drop 1.8 Vdc (at pin "A").

The gauge senses these voltages through pin 13 of its connector, and interprets them as signals that tell it which switch is activated (VTS UP or VTS DOWN).

Since the command signal generated by the closure of a VTS switch concerns the VTS module, a circuit within the gauge will translate it to CAN protocol and transmit it through the CAN bus. The VTS module will react to the command, carry out the function, and transmit the result back through the CAN bus.

The gauge will use the signals from the switches and the transmitted information from the other modules, convert them to an indication, and cancel the command signal it sent out once the function has been carried out.

NOTE: The voltages stated above vary slightly depending on the actual voltage applied to the circuit and the current flow through the diodes. When using a Fluke 115 multimeter for testing in diode test mode, the voltage and current applied by the multimeter are lower than in circuit. The quality of probe contact, the actual probes and leads, and the precision of the meter calibration will all affect the results, which will most likely be slightly lower than nominal values stated.

VTS Control Button Functional Test Using iBR Override Function

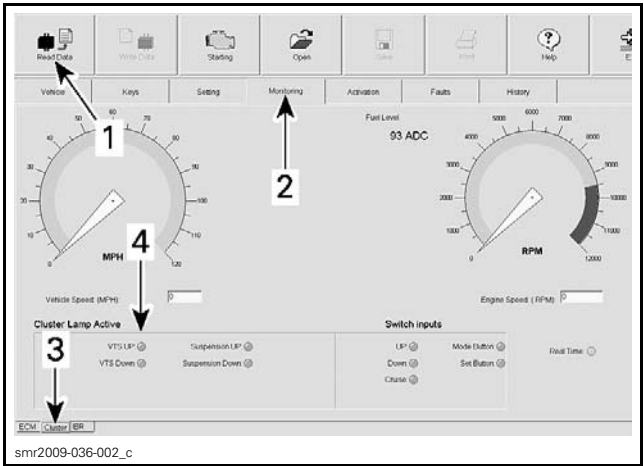
1. Press the START/STOP button.
 2. Install tether cord to power up the electrical system.
- NOTE:** Briefly press the START/STOP button to reactivate the electrical system when required.
3. Activate the iBR override function, refer to *SYSTEM DESCRIPTION (iBR)* in this subsection.
 4. Press and hold the VTS DOWN arrow button. The iBR gate and steering nozzle will move downwards together until they reach the full VTS down position. The iBR gate will then continue moving to the full reverse/braking position alone.
 5. Depress and hold the VTS UP arrow button and ensure the iBR gate moves up to the forward position.

NOTE: If the VTS button is released before full travel of the iBR gate, movement of the iBR gate will cease.

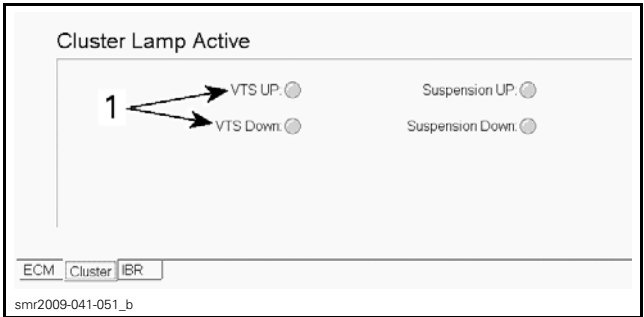
If the iBR does not respond to VTS button commands (UP or DOWN), carry out the following *VTS SWITCH TEST USING B.U.D.S.*

VTS Control Button Test Using B.U.D.S.

1. Connect watercraft to the latest B.U.D.S. software, refer to *COMMUNICATION TOOLS AND B.U.D.S.*
2. Click the **Read Data** button.
3. Check for an applicable fault code on the *FAULTS* page.
4. Click the **Monitoring** tab.
5. In the lower LH corner, click the **Cluster** tab.
6. On the LH handlebar, press the VTS UP and DOWN button alternately and look for the VTS UP and VTS Down indicator lights to come on in the **Cluster Lamp Active** area in B.U.D.S.



TYPICAL
1. Read Data button
2. Monitoring tab
3. Cluster tab
4. Cluster Lamp Active area



TYPICAL
1. VTS UP and VTS Down indicator lights

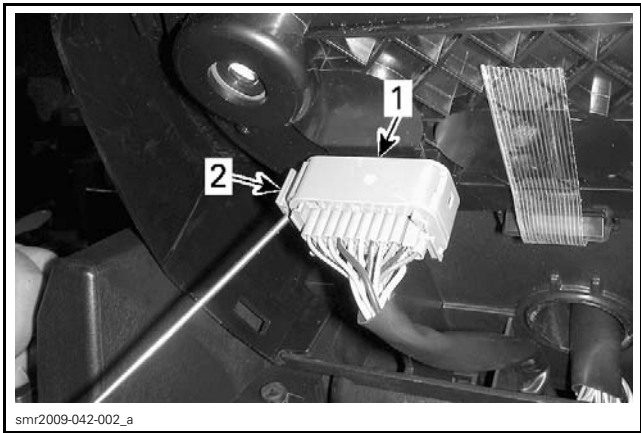
If each of the gauge button indicator lights come on when the applicable switch is pressed, the VTS control button switches and wiring are good. The problem may be related to the information center or iBR module.

If one or all of the indicator lights do not come on, refer to *VTS CONTROL BUTTON TEST USING A MULTIMETER*.

VTS Control Button Test Using a Multimeter

- 1. Remove the gauge support cover, refer to *GAUGE* subsection.
- 2. Disconnect the gauge connector.

NOTICE Pull connector lock out. Do not twist the screwdriver.



- 1. Gauge connector
- 2. Pull out to unlock connector

- 3. Use a FLUKE 115 MULTIMETER (P/N 529 035 868) set to the diode test function. Test the VTS button switches as per following tables.

NOTE: It is important to set the multimeter to the diode check function when testing the VTS control switches.



NOTE: Pay attention to multimeter lead position for diode biasing during test. Remember that each diode should drop approximately 0.6 Vdc when positively biased, and read as an OL (open circuit) when negatively biased (leads reversed).

VTS CONTROL TEST			
SWITCH POSITION	MULTIMETER LEAD	GAUGE CONNECTOR	VOLTAGE
Switch released	RED lead BLACK lead	Pin 13 Pin 15	Approx. 2 Vdc
	BLACK lead RED lead	Pin 13 Pin 15	OL
UP depressed	RED lead BLACK lead	Pin 13 Pin 15	Approx. 1.1 Vdc
	BLACK lead RED lead	Pin 13 Pin 15	OL
DOWN depressed	RED lead BLACK lead	Pin 13 Pin 15	Approx. 1.6 Vdc
	BLACK lead RED lead	Pin 13 Pin 15	OL

When measuring between pins 13 and 15, if an OL is obtained with both positive and negative diode biasing, test the continuity of each wire between the gauge and switch assembly. If continuity is good, replace the switch assembly.

If any reading is significantly different than specified, carry out the same test at the switch connector, refer to the wiring diagram. If you obtain the same results, replace the switch assembly.

If voltages measured on the VTS UP and DOWN switch are as specified (or very close to it), the switches and the wiring harness are good. The

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fault may be within the gauge. Replace the gauge and carry out a new *VTS BUTTON TEST USING B.U.D.S.* to ensure the problem is solved.

VTS Control Button Removal

NOTE: The VTS and SPORT/ECO control buttons may come as a switch assembly that must be replaced as a unit.

Models with a VTS Switch

1. Remove steering cover, refer to *STEERING AND O.T.A.S.*

Models Without a VTS Switch

2. Remove the upper housing and housing cover from the LH handlebar housing.

All Models

3. Remove connector from switch assembly.



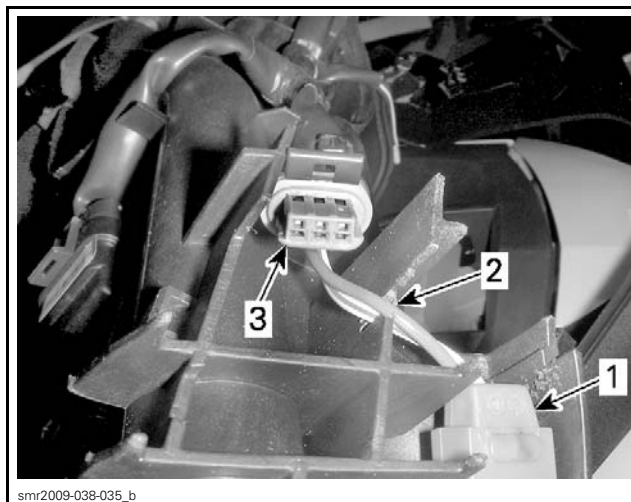
TYPICAL

1. SPORT/ECO switch connector

4. Remove switch assembly from support by lifting it off the support.

VTS Control Button Installation

1. Apply a small amount of DIELECTRIC GREASE (P/N 293 550 004) on switch contact pins.
2. Install connector on new switch assembly.
3. Ensure wiring from START switch is properly inserted in slot provided before installing VTS and SPORT/ECO control switch assembly.



1. START/STOP switch
2. Wiring routed in slot provided in support
3. SPORT/ECO switch connector

4. Insert switch assembly in switch support.
5. Install remaining removed parts, refer to *STEERING AND O.T.A.S.*
6. Carry out an operational test of the VTS and iS systems to ensure proper operation of new switch assembly.