

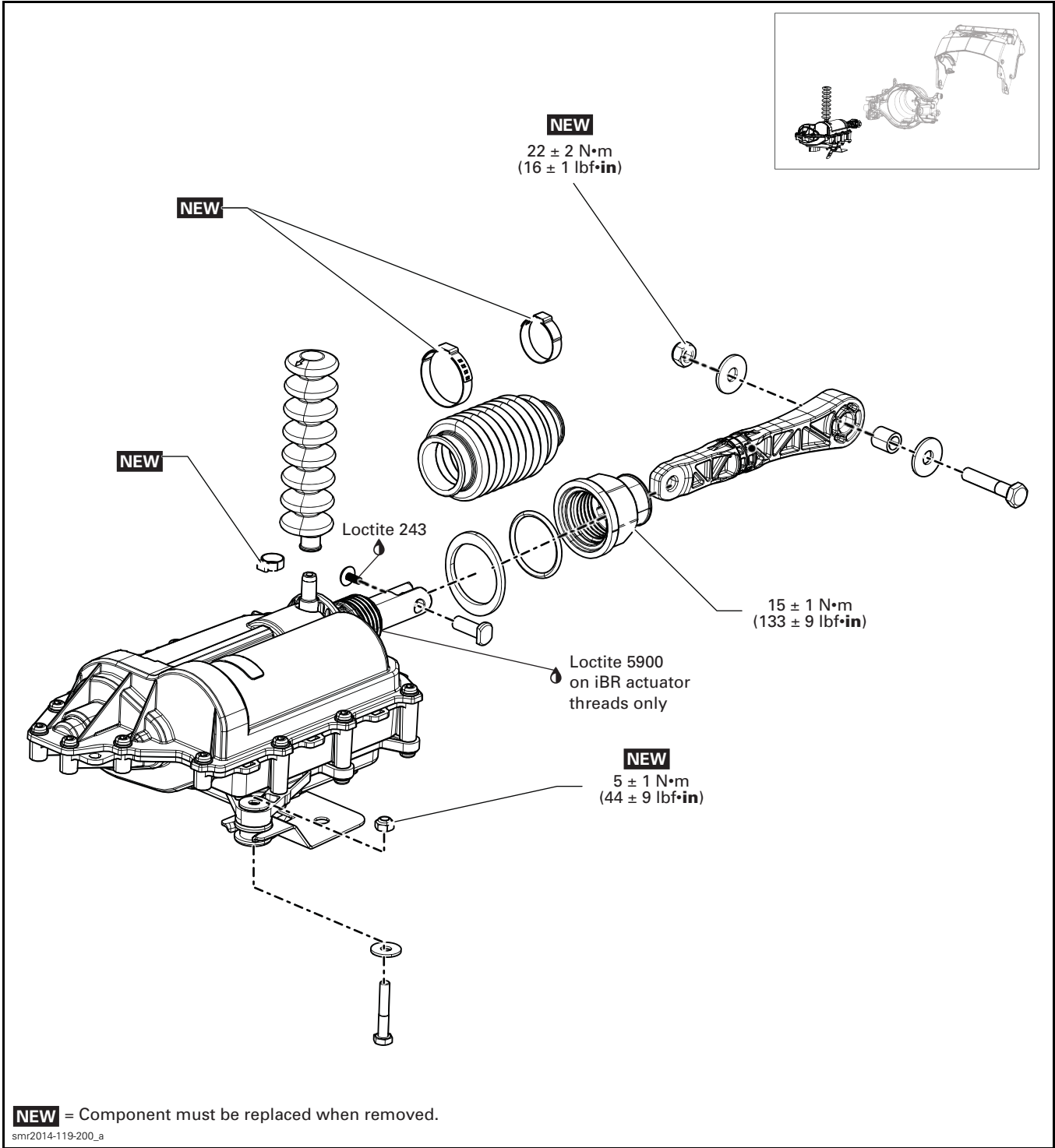
iBR SYSTEM

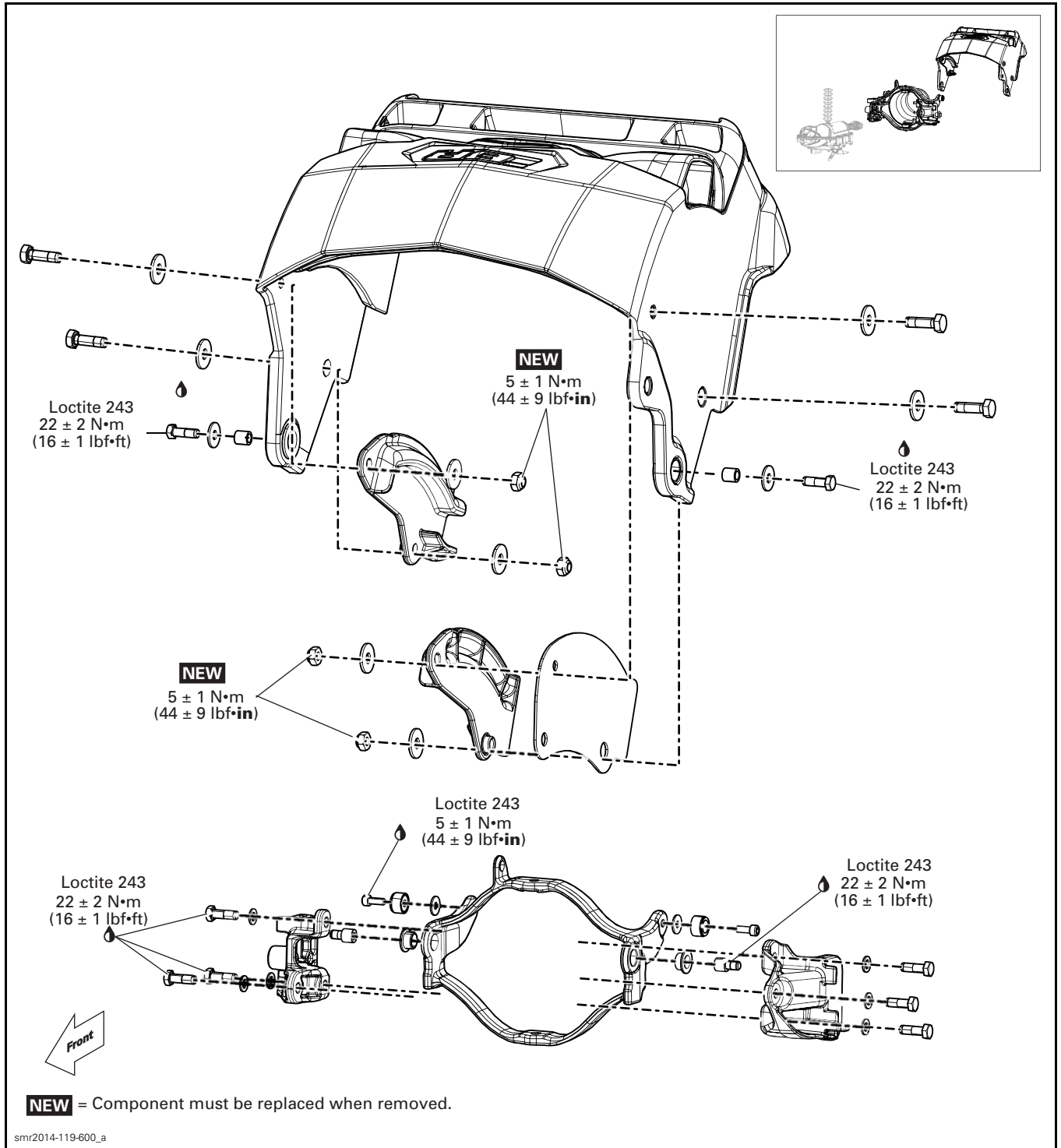
SERVICE TOOLS

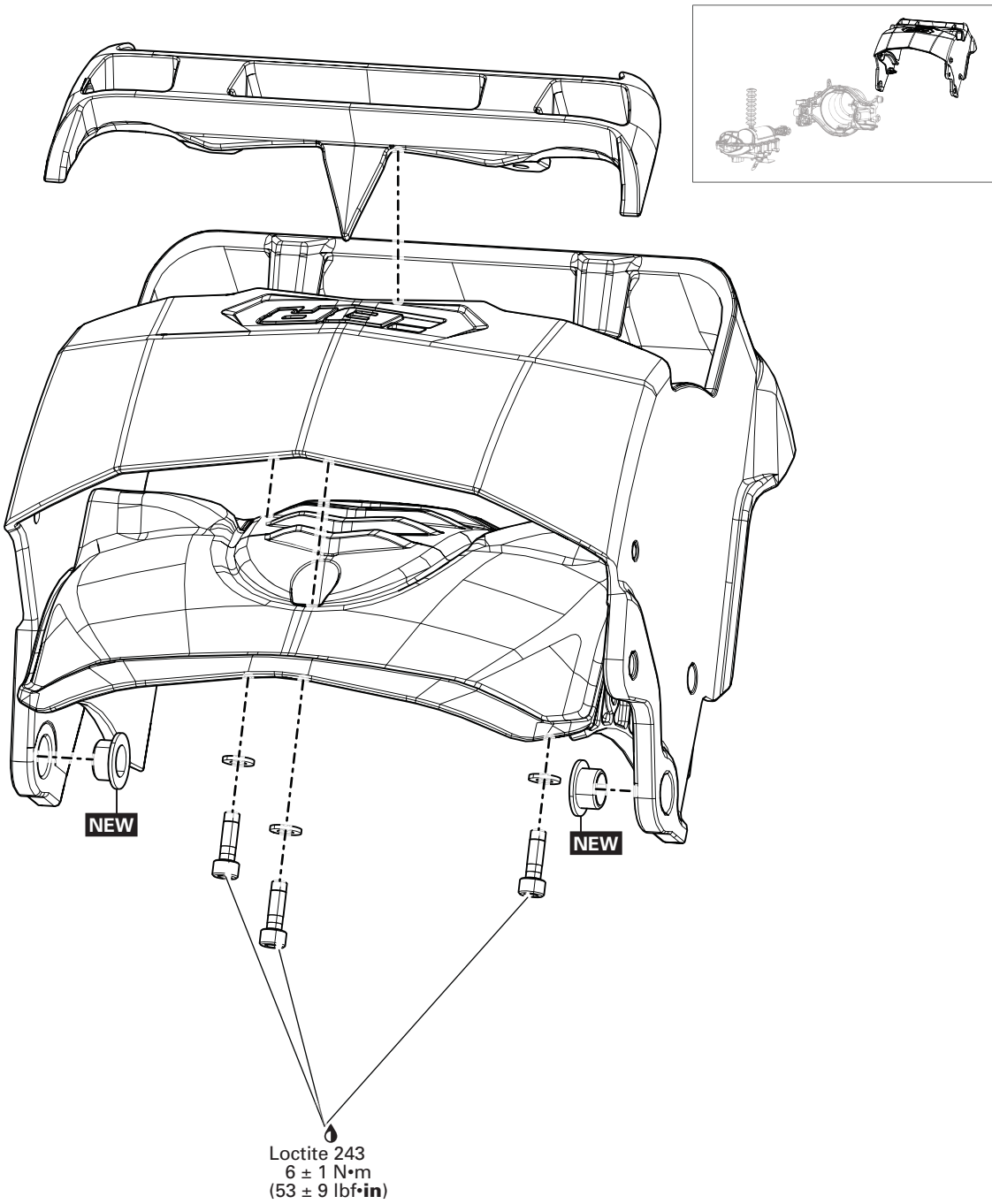
Description	Part Number	Page
DIAGNOSTIC HARNESS	529 036 276	10–11
ENGINE ALIGNMENT PLATE	529 036 278	13
IBR NUT SOCKET	529 036 305	14

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	15
LOCTITE 5900	293 800 066	15







NEW = Component must be replaced when removed.

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GENERAL

During assembly/installation, use torque values and service products as indicated in the exploded view. Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

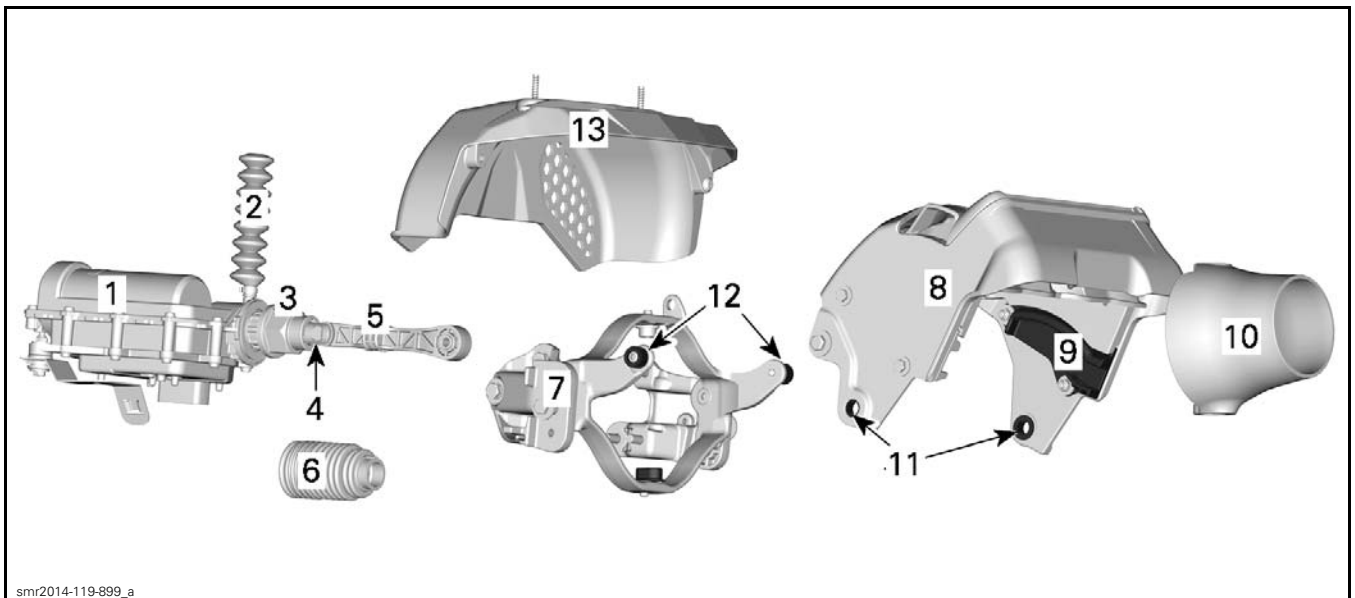
WARNING

Torque wrench tightening specifications must be strictly adhered to. Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, cotter pins, etc.) must be replaced with new ones.

Hoses, cables or locking ties removed during a procedure must be reinstalled as per factory standards.

SYSTEM DESCRIPTION (iBR)

Nomenclature



iBR SYSTEM COMPONENTS

1. Actuator
2. Air chamber
3. iBR nut
4. Actuator shaft
5. Connecting arm
6. Boot
7. Gate support bracket
8. Gate
9. Support plate
10. Nozzle
11. Gate bushings
12. Friction sleeves
13. Protective guard (models without boarding platform)

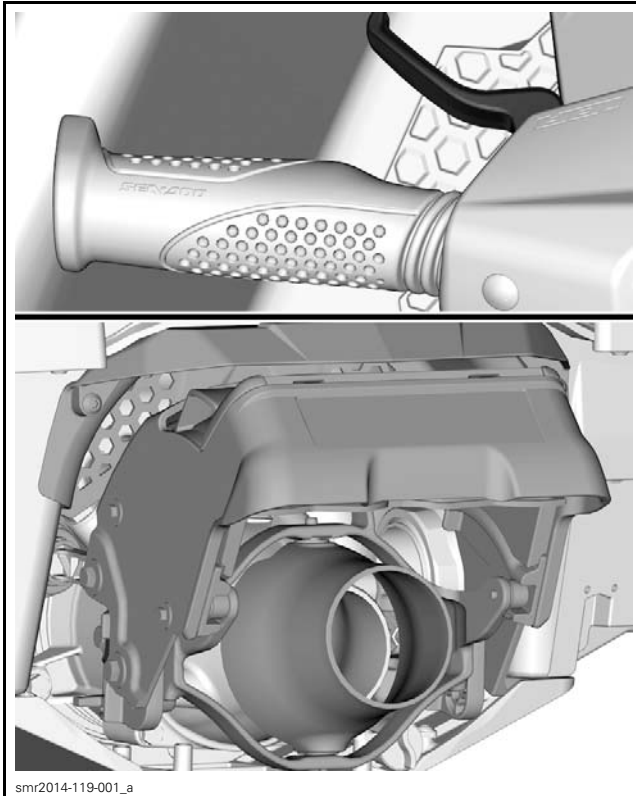
The iBR (intelligent Brake and Reverse) is an electronically controlled braking and reverse system.

The iBR actuator controls the position of the iBR gate to provide forward thrust, reverse thrust, braking thrust, and neutral.

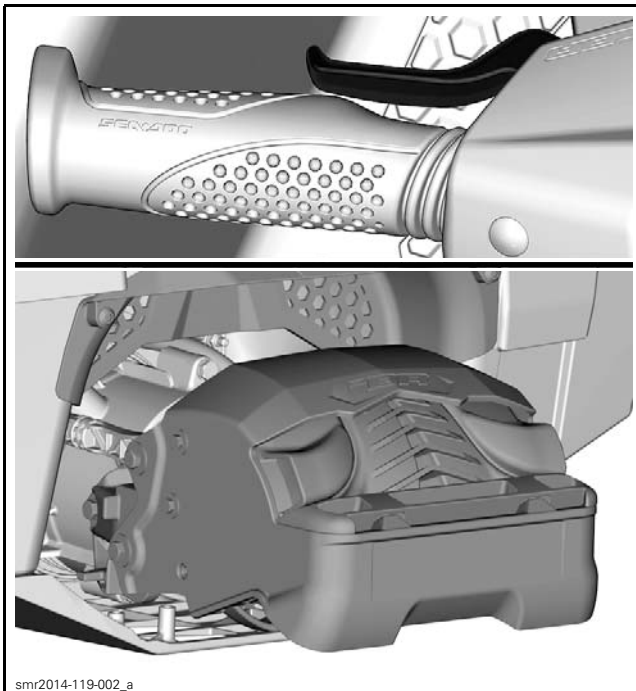
The operator commands the position of the iBR gate using either the throttle lever for forward thrust, or the iBR lever for neutral, reverse, and for the braking function.

The iBR lever is located on the LH side of the handlebar.

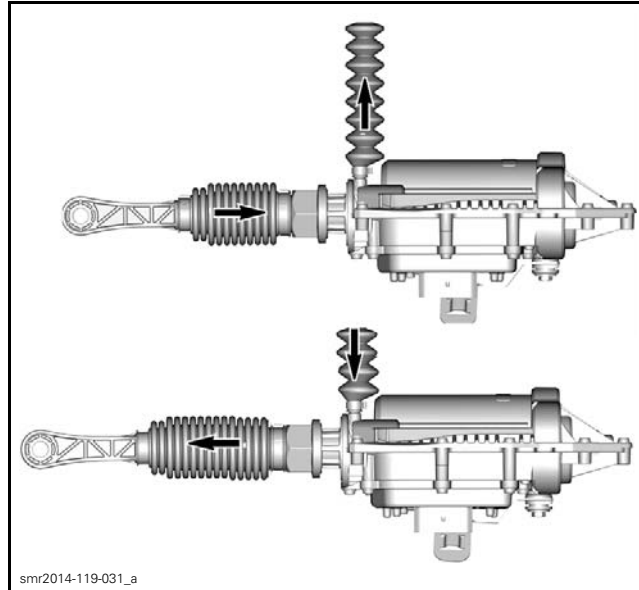
Subsection 02 (iBR SYSTEM)



FORWARD



REVERSE



iBR ACTUATOR AIR CHAMBER MOVEMENT

The BRLS sends the signals to the iBR actuator. The iBR actuator controls an electric motor that in turn raises or lowers the iBR gate.

NOTE: The iBR gate will move when commanded by the iBR lever only if the engine is running. For maintenance purposes, use B.U.D.S. to move the gate to the desired position.

Depending on vehicle speed and how far the iBR lever is pulled in, the iBR actuator will automatically adjust the iBR gate movement speed and stroke. Engine RPM may also be modified.

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 may be momentarily reduced as the gate moves.

WARNING

If it is necessary to remove any foreign object caught 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).

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.
- 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.

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 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 increased, 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.

ADJUSTMENT

iBR NEUTRAL POSITION

Adjusting iBR Neutral Position

No adjustment is possible or necessary.

MAINTENANCE

Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection of this shop manual.

INSPECTION

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 mechanism is in good condition and does not show signs of excessive wear or friction.
- Check system fuses.
- 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 actuator is indicated, or the iBR actuator is not visible in B.U.D.S., carry out a continuity test of the CAN bus wires. Refer to *CAN COMMUNICATION TEST* in this subsection.
- 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.
- Remove the screw retaining the gate to the connecting arm. Move the gate up and down by hand to check for freedom of movement.

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.

 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. 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

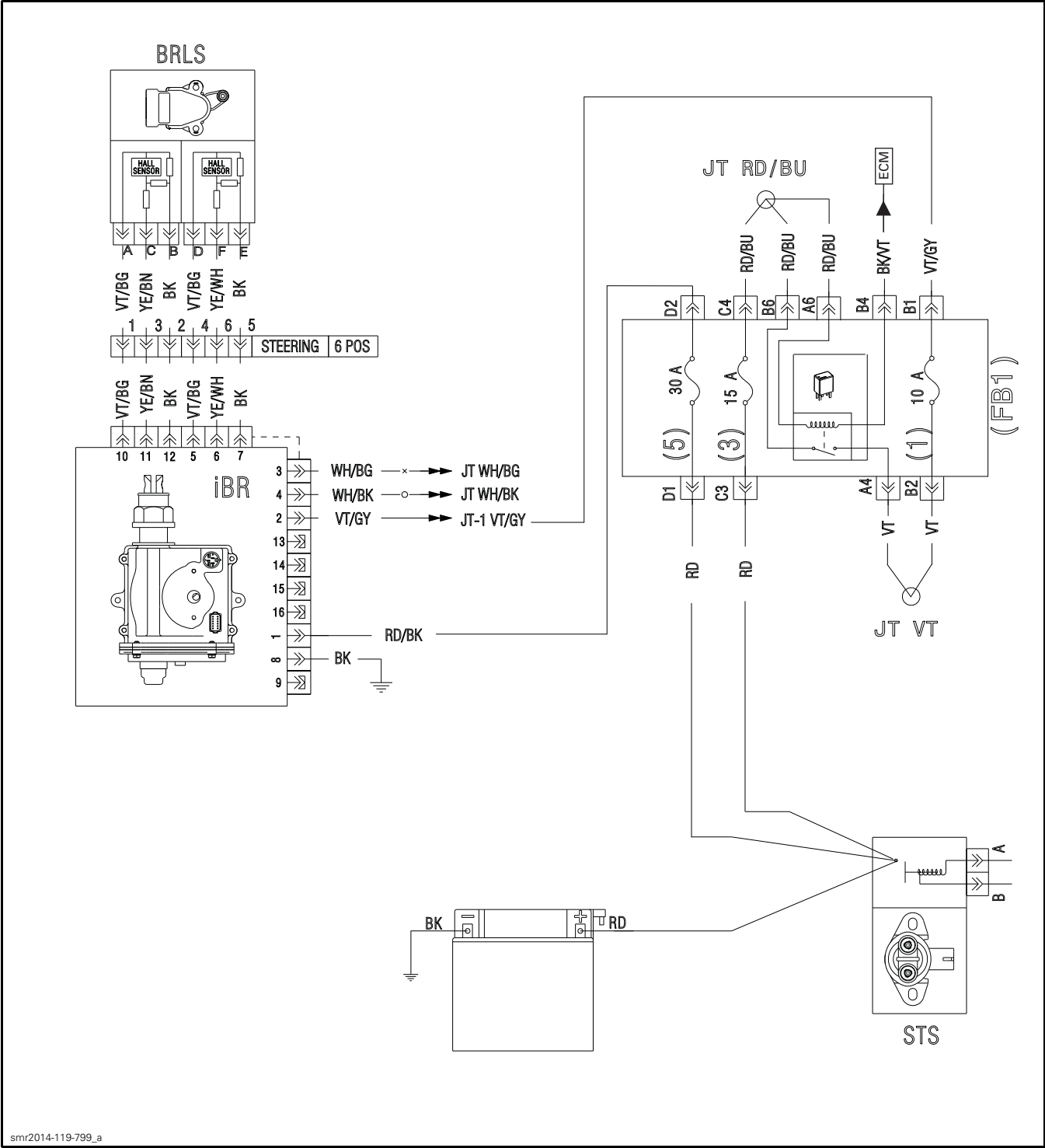
1. Start engine and let idle.

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.

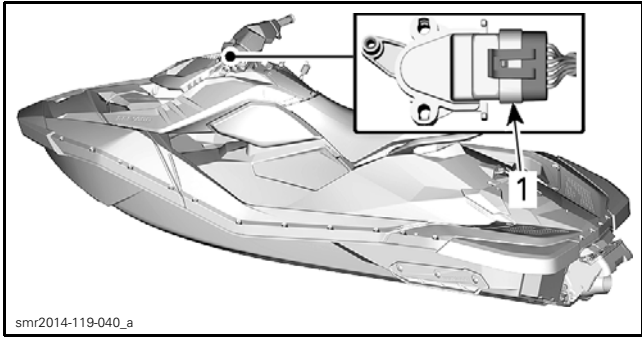
PROCEDURES

DEFINITION	ACRONYM
Key On Engine Off	KOEO
Key On Engine Running	KOER

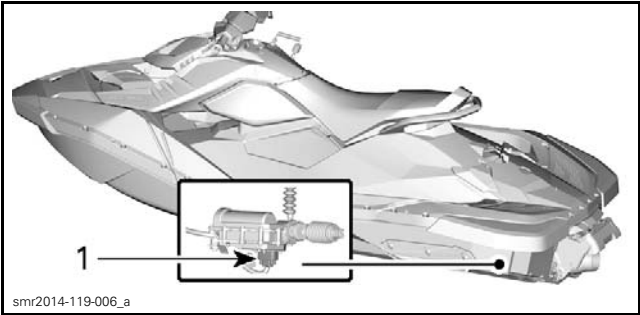


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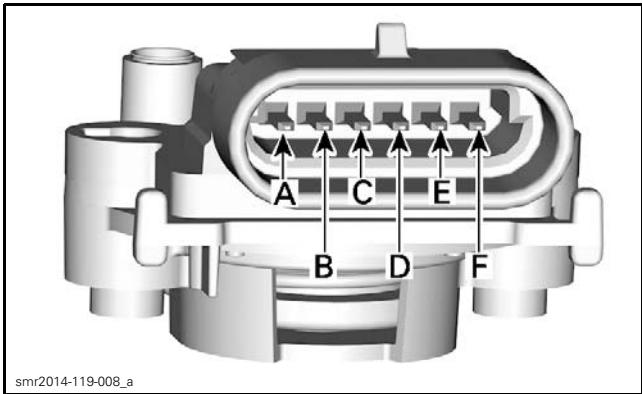
Subsection 02 (iBR SYSTEM)



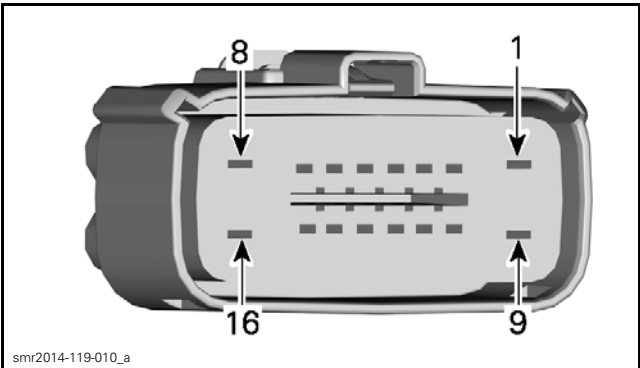
1. BRLS



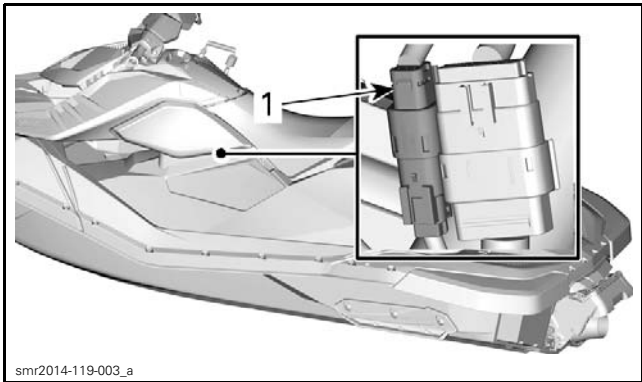
1. iBR actuator connector



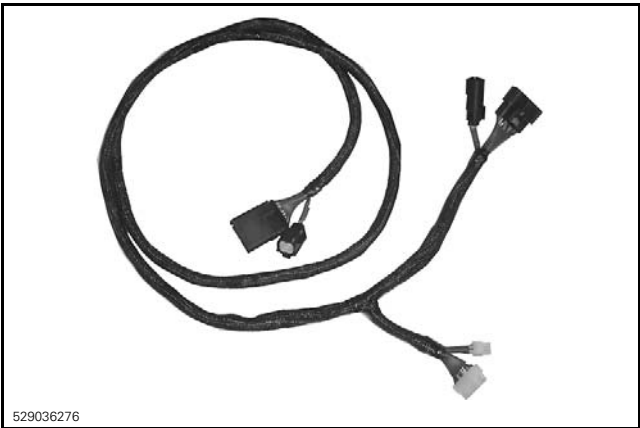
BRLS PINOUT



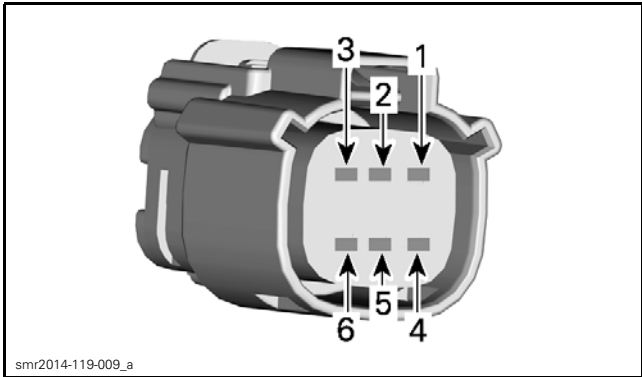
iBR ACTUATOR CONNECTOR



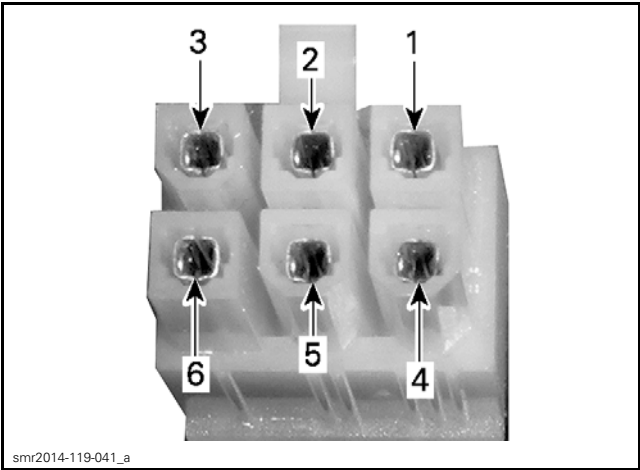
1. Steering 6 pos. connector



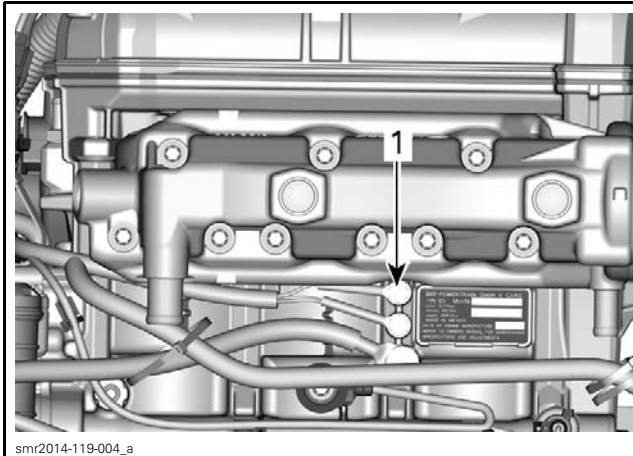
SERVICE TOOL
DIAGNOSTIC HARNESS (P/N 529 036 276)



STEERING 6 POS. CONNECTOR



DIAGNOSTIC HARNESS - STEERING 6 POS. CONNECTOR



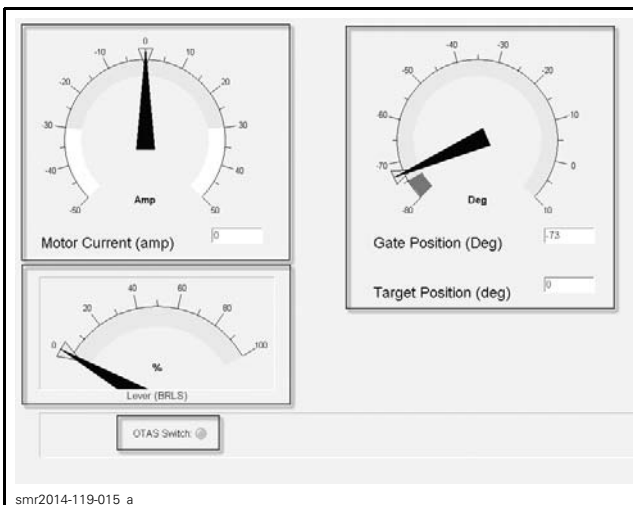
LH SIDE , UNDER EXHAUST MANIFOLD
1. iBR ground

BRLS

Testing and Specifications

BRLS REFERENCE TABLE - KOEO	
PIN	SIGNAL
BRLS-A	5 VDC
BRLS-B	GND
BRLS-C	View signal % in B.U.D.S.
BRLS-D	5VDC
BRLS-E	GND
BRLS-F	View signal % in B.U.D.S.

NOTE: When moving BRLS lever, the BRLS percentage should increase or decrease in a steady linear fashion.



MONITORING iBR IN B.U.D.S.

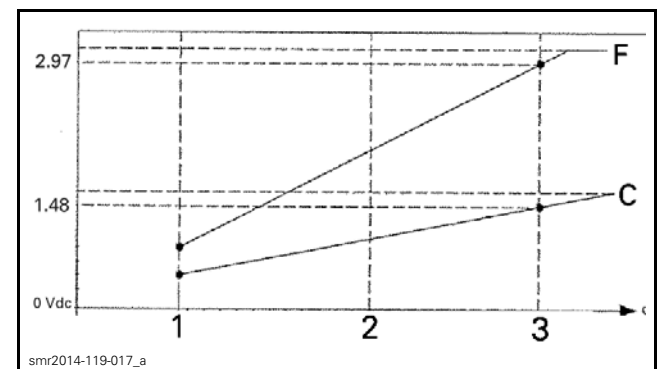
If B.U.D.S. does not show BRLS percentage moving or if reading is erratic:

- Check for BRLS reference voltage.
- Check for BRLS ground.
- Carry out a continuity test of the wiring between the iBR actuator and the BRLS.

Refer to *PROCEDURES* in this subsection for wiring diagram and pinouts.

NOTE: When installed on vehicle the BRLS-C Vdc signal should always be half of the BRLS-F Vdc signal when testing with a multimeter.

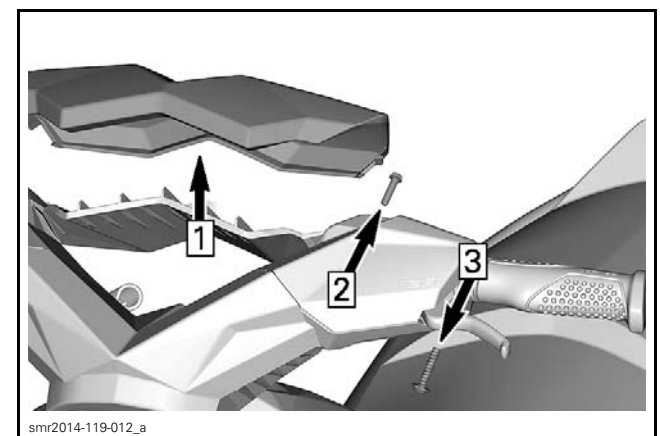
Test with DIAGNOSTIC HARNESS (P/N 529 036 276)

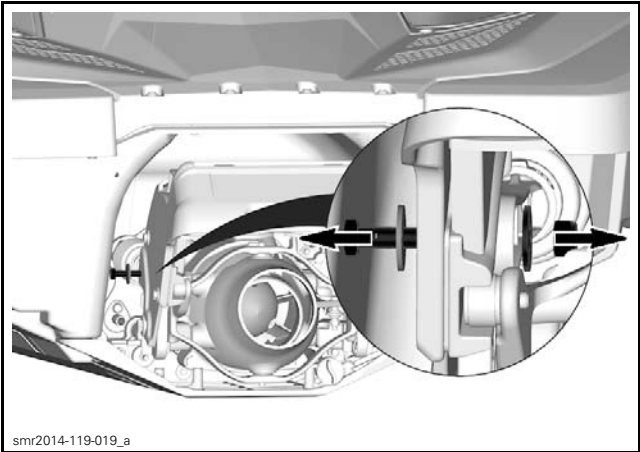
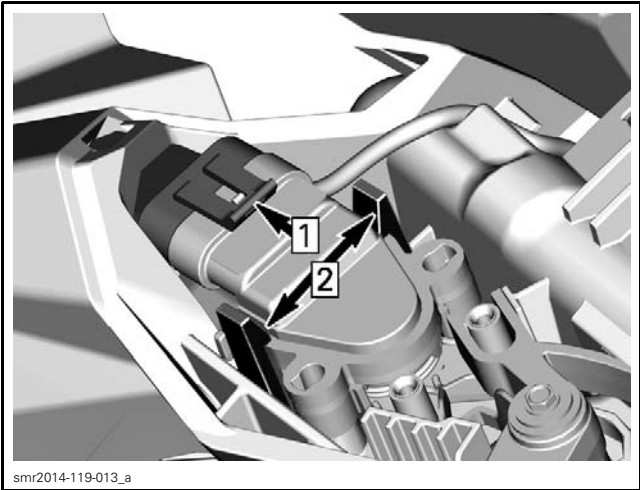


APPROXIMATE BRLS SIGNAL VOLTAGE CURVE PINS F AND C

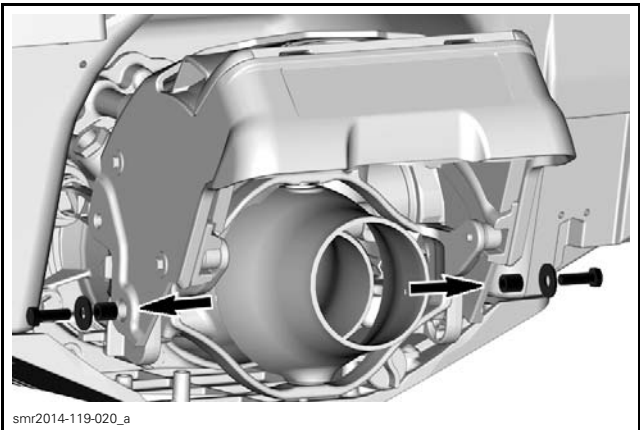
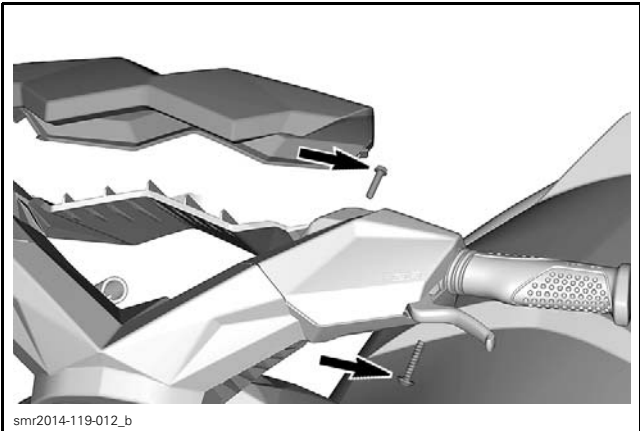
1. BRLS released
2. BRLS at 50% pulled
3. BRLS fully pulled

Removal





Installation



TIGHTENING TORQUE	
BRLS Switch Cover Screws	2.5 N•m ± 0.5 N•m (22 lbf•in ± 4 lbf•in)

iBR GATE

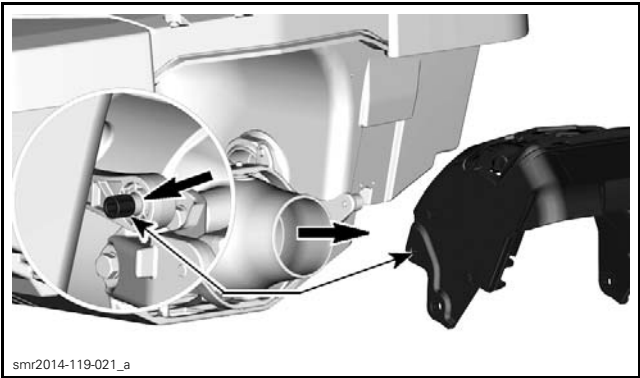
Removal

3UP models

Removal of 3UP boarding platform is not necessary but greatly improves access.

All models

NOTE: iBR gate raised for illustration purposes. Gate should be at neutral position.



Installation

Reverse removal procedure. Apply proper torque and service products as applicable in exploded view(s) at the beginning of this subsection.

iBR GATE SUPPORT

Removal

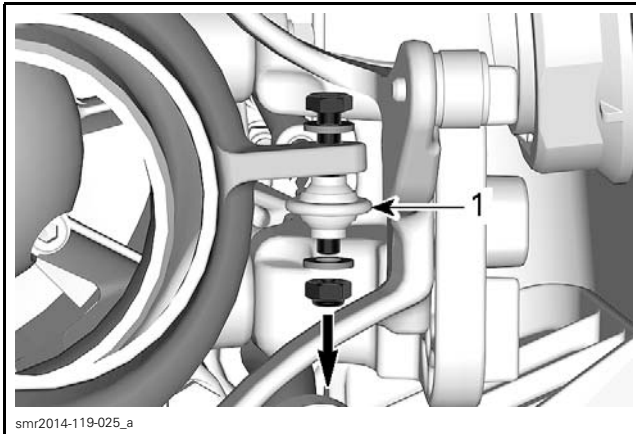
3UP models

Removal of 3UP boarding platform is not necessary but greatly improves access.

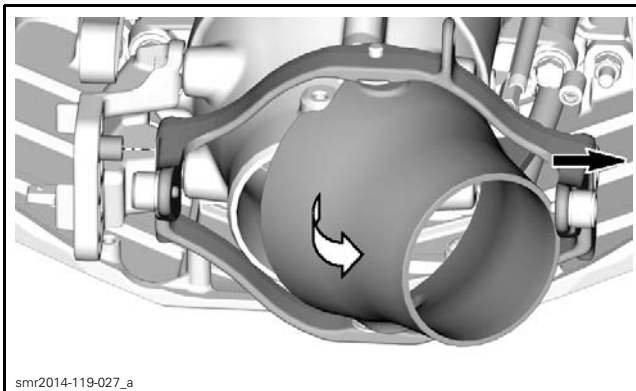
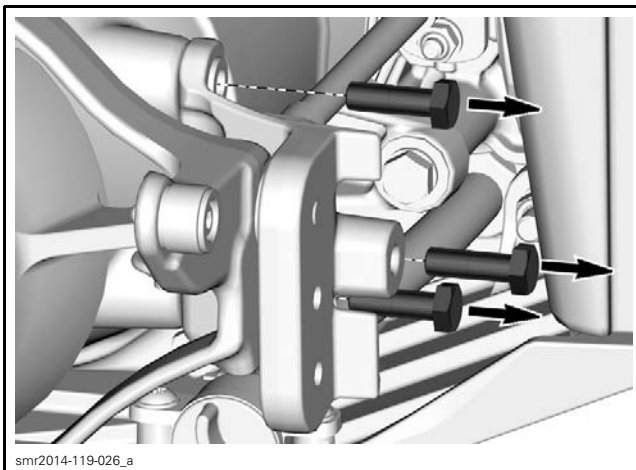
All models

NOTE: Jet pump nozzle is removed with iBR gate support.

NOTE: iBR gate raised for illustration purposes. Gate should be at neutral position.

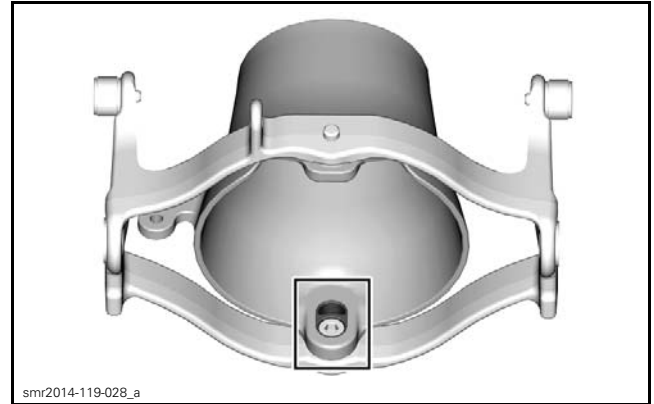


1. Steering cable



Installation

NOTE: Unlike base models, 2UP iBR and 3UP iBR nozzles are mounted with the lower bushing as illustrated.



TIGHTENING TORQUE	
M8 nozzle retaining screws	24 N•m ± 2 N•m (18 lbf•ft ± 1 lbf•ft)

iBR ACTUATOR

Specifications

iBR REFERENCE TABLE - KOEO	
PIN	SIGNAL
iBR-1	Battery voltage
iBR2	Battery voltage
iBR-8	GND

Removal

3UP models

Removal of 3UP boarding platform is not necessary but greatly improves access.

All models

1. Remove central body. Refer to *BODY* subsection.

NOTE: Removing the muffler is not necessary but greatly improve access.

2. Remove iBR gate. Refer to *iBR GATE* in this subsection.

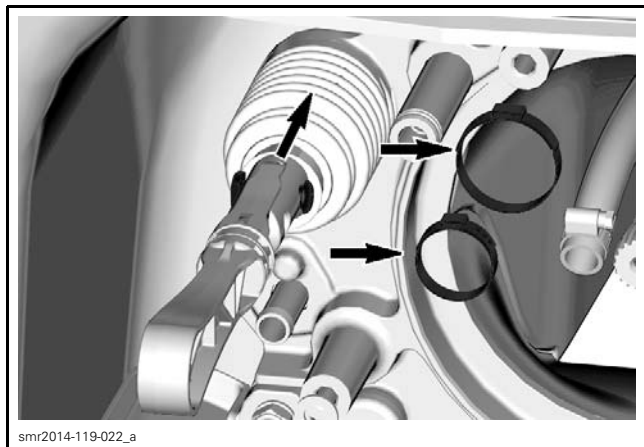
3. Remove jet pump assembly. Refer to *JET PUMP* subsection.

Temporarily fasten the ENGINE ALIGNMENT PLATE (P/N 529 036 278) to pump support to support drive shaft and avoid PTO oil seal damage.

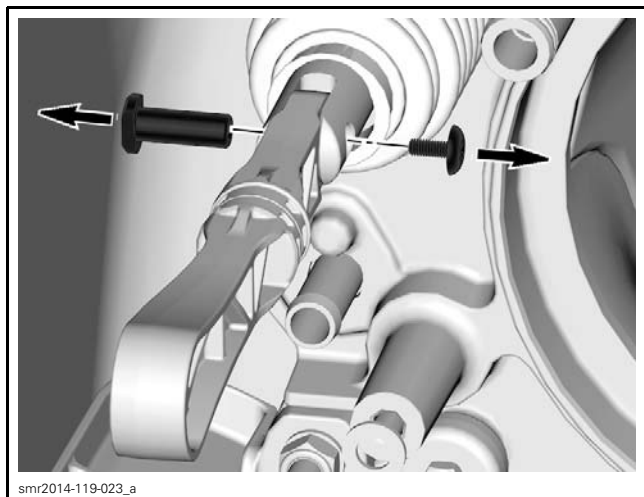
Subsection 02 (iBR SYSTEM)



4. Remove Oetiker clamps.



5. Remove connecting arm, sleeve and screw.



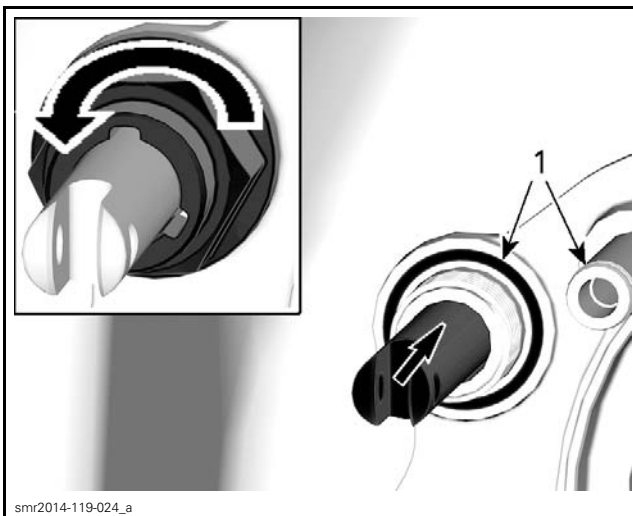
NOTE: If jet pump was not removed, rotate the connecting arm for access to sleeve and screw.

NOTICE Do not unscrew iBR shaft, only turn it enough for access to screw.



6. Remove iBR nut. Use IBR NUT SOCKET (P/N 529 036 305).

7. Push iBR actuator into hull and remove.



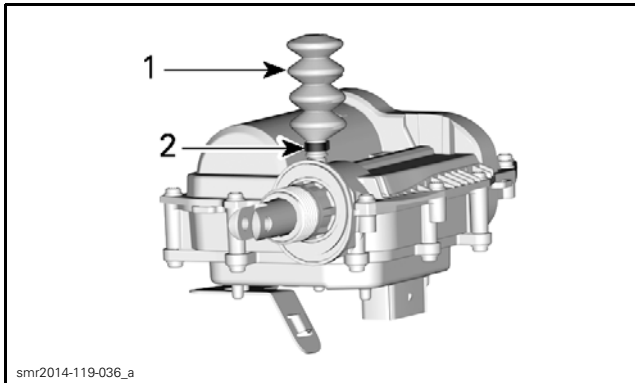
1. *Inspect o-rings*

Installation

NOTICE Failure to adhere to the sequence in the following steps will cause the iBR air chamber to rupture or burst and cause premature failure of the iBR actuator.

1. Install the air chamber on the iBR actuator.

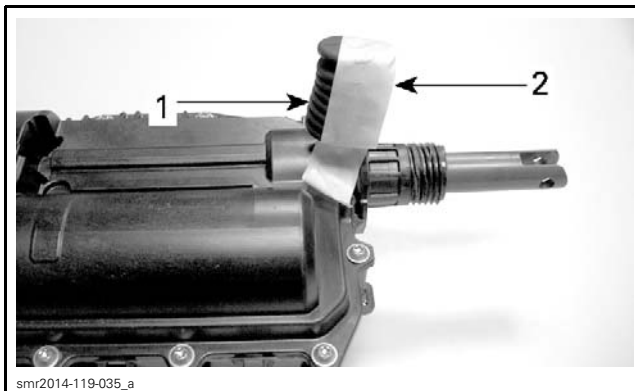
1.1 Camp the Oetiker clamp.



smr2014-119-036_a
1. Air chamber
2. Oetiker clamp

2. Tape the air chamber down.

NOTE: Ensure the air chamber is empty of air.



smr2014-119-035_a
iBR ACTUATOR
1. Air chamber
2. Tape

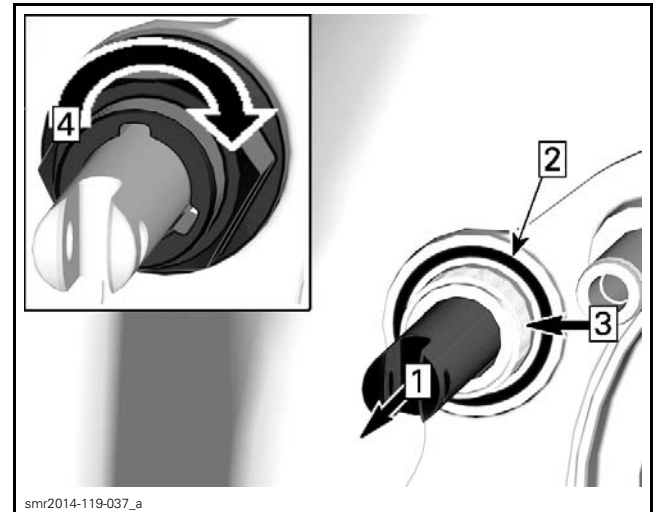
3. Connect iBR actuator connector

4. Install iBR actuator shaft through hull opening.

5. Slide the o-ring into position.

NOTICE Apply LOCTITE 5900 (P/N 293 800 066) to iBR actuator threads only. Wipe off any excess on iBR shaft immediately.

6. Torque iBR nut.



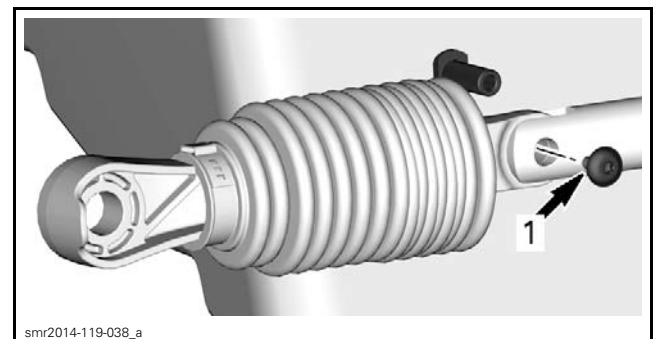
smr2014-119-037_a
Step 1: iBR shaft
Step 2: O-ring
Step 3: LOCTITE 5900 (P/N 293 800 066)
Step 4: iBR nut

7. Place the boot, with the Oetiker in place but not clamped, over the connecting arm.

8. Apply LOCTITE 243 (BLUE) (P/N 293 800 060) to connecting arm screw.

9. Install connecting arm, sleeve and screw.

9.1 Torque screw.



smr2014-119-038_a
1. LOCTITE 243 (BLUE) (P/N 293 800 060)

10. Make sure the tape holding the air chamber empty is still in place.

10.1 Clamp the Oetiker clamps on the iBR boot

11. Remove the tape on the air chamber.

NOTE: The air chamber should remain partially collapsed.

2UP models

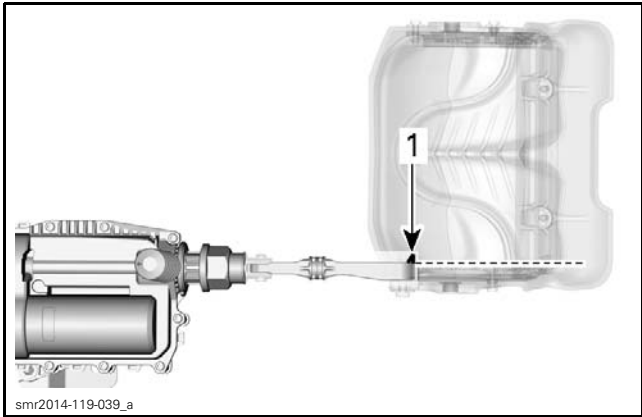
NOTE: If removed, do not reinstall iBR reverse gate protective guard yet.

Subsection 02 (iBR SYSTEM)

All models

Reverse removal procedure. Apply proper torque and service products as applicable in exploded view(s) at the beginning of this and *JET PUMP* subsections.

12. Attach the gate assembly.



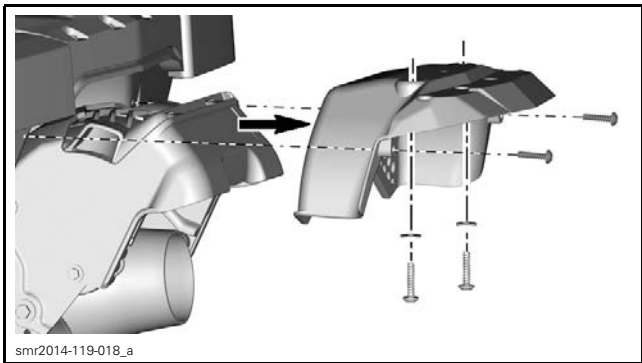
1. Protrusion on connecting arm

Perform *iBR AUTO CALIBRATION USING B.U.D.S.* procedure in this subsection.

iBR AUTO CALIBRATION USING B.U.D.S.

2UP models

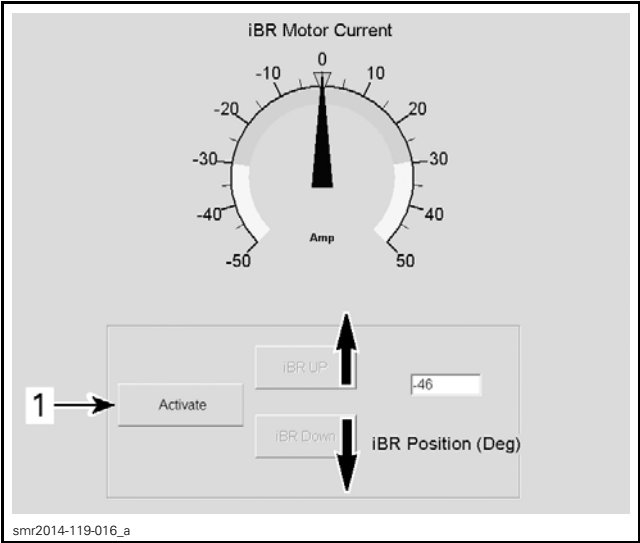
1. Remove iBR reverse gate protective guard.



iBR REVERSE GATE PROTECTIVE GUARD

All models

2. Activate (if new iBR actuator)

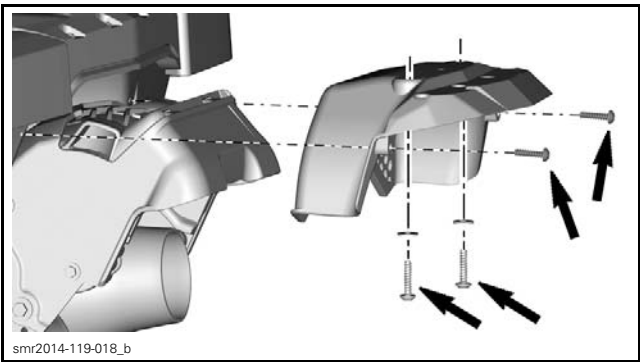


ACTIVATION iBR IN B.U.D.S.
1. Button only available with new part

3. Auto-calibrate

2UP models

4. Install iBR reverse gate protective guard.

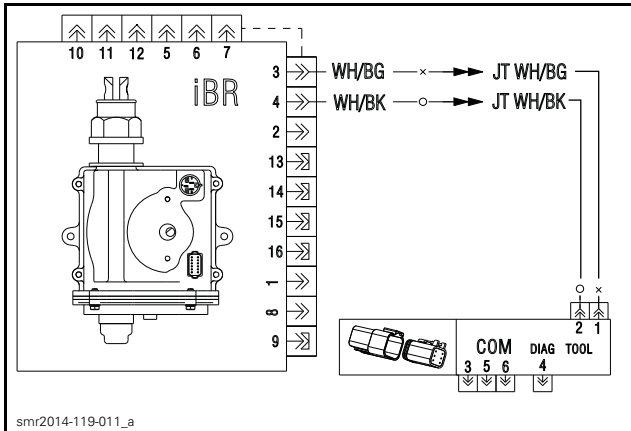


iBR REVERSE GATE PROTECTIVE GUARD

TIGHTENING TORQUE	
iBR Reverse Gate Protective Guard Screws	7 N•m ± 1 N•m (62 lbf•in ± 9 lbf•in)

CAN COMMUNICATION TEST

CAN WIRE RESISTANCE TEST		
IBR ACTUATOR CONNECTOR PIN	COM CONNECTOR PIN	SPECIFIED RESISTANCE
iBR-3	COM-1	0 Ω
iBR-4	COM-2	0 Ω



Refer to *PROCEDURES* in this subsection for wiring diagram and pinouts.

Refer to *CONTROLLER AREA NETWORK (CAN)* subsection for additional information.