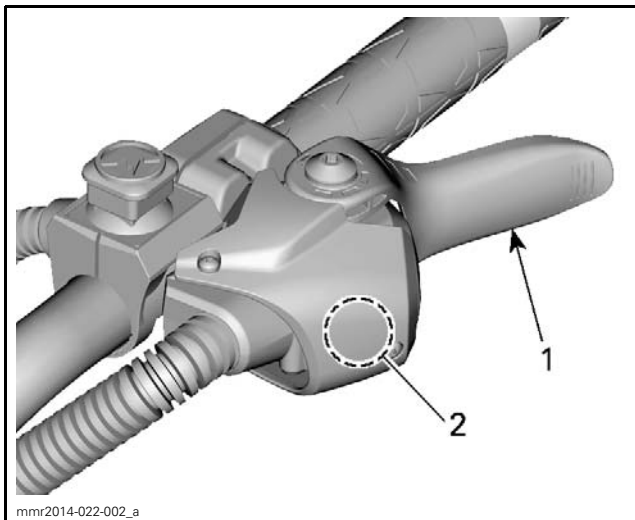


INTELLIGENT THROTTLE CONTROL (iTC)

GENERAL

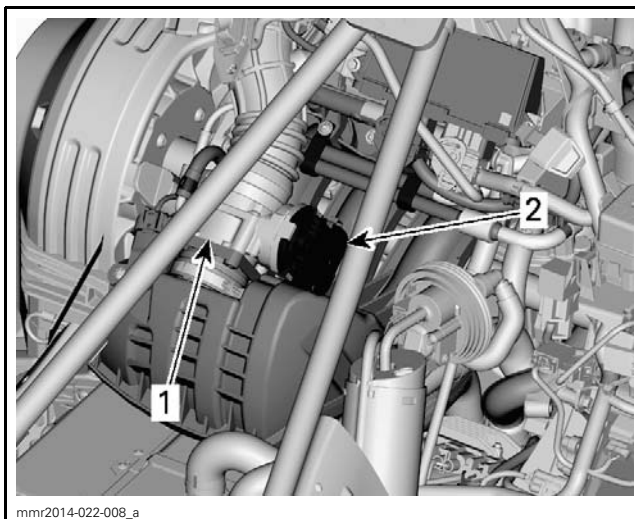
SYSTEM DESCRIPTION

The iTC is an electronic throttle control system that includes a cableless throttle accelerator sensor (TAS) located on the RH side of handlebar, an electric throttle control (ETC) located on the throttle body and the engine control module (ECM). The iTC is often referred to as a "throttle by wire" system.



TYPICAL

1. Throttle lever
2. Throttle accelerator sensor (TAS)



TYPICAL

1. Throttle body
2. Throttle actuator

The ETC is equipped with a motor which controls the throttle opening.

The position of the throttle is measured with two potentiometers.

The ECM evaluates the throttle position with these two measures and controls the motor to reach the desired position.

These potentiometers are powered by the ECM with a voltage of 3.3 volts.

The signals given by these potentiometers vary from 0.33V to 2.97V for (SIGNAL 1) and 2.97V to 0.33V for (SIGNAL 2).

The relation between these two signals is (SIGNAL 1) + (SIGNAL 2) = 3.3V.

When ECM is woken up, throttle body will close completely to reinitialize. For both signals to be properly set at idle position.

If a problem occurs with any of these controls or signals then a diagnostic fault code will be generated.

Fault Codes Relating to Position Signal

P212C

This fault happens when the voltage for signal #2 on pin ETC-4 is less than 0.33 volt. It can happen if the ETC connector is unplugged, if the system circuit ETC-4 is not connected nor has a bad electrical contact on one of its terminals or even if it's shorted to ground. The same principle applies with system circuit ETC-6 which is the 3.3 volts supply from the ECM to the ETC. If the supply is too low or missing then the signal #2 is most likely to be too low.

P212D

This fault happens when the voltage for signal #2 is higher than 2.97 volts. It can happen if the ground connection on connector ETC-2 is missing, if the 3.3 volts supply from the ECM is too high.

P2620

This fault can happen if the throttle position measured by the ETC doesn't reflect the desired position for a specific engine speed (RPM). This fault can happen when the sum of the voltages for Signal #1 (ETC-1) and Signal #2 (ETC-4) doesn't equal 3.3 volts. Either one of these signal has an error.

These signals may be in error if the 3.3 volt supply (ECT-6) is not correct or if the ground wire (ETC-2) is open.

P2621

This fault happens when the voltage for signal #1 on pin ETC-1 is less than 0.33 volt. It can happen if the ETC connector is unplugged, if the system circuit ETC-1 is not connected nor has a bad electrical contact on one of its terminals or even if it's shorted to ground. The same principle applies with system circuit ETC-6 which is the 3.3 volts supply from the ECM to the ETC. If the supply is too low or missing then the signal #2 is most likely to be too low.

P2622

This fault happens when the voltage for signal #1 is higher than 2.97 volts. It can happen if the ground connection on connector ETC-2 is missing, if the 3.3 volts supply from the ECM is too high.

Fault Codes Relating to Electric Motor and Mechanical Behavior

P160E

The control voltage of line ETC-5 for the ETC motor is too low. This circuit may be shorted to the ground or the ECM has an internal malfunction.

P1610

Current drawn by the ETC motor is too high. The control line ETC-3 or ETC-5 may be shorted together or shorted to ground.

P1613

The ETC motor is not detected. The control line ETC-3 or ETC-5 may be disconnected. The ETC motor is open circuit.

P1614

When the ECM power is activated an ETC test is performed and this fault will show if the ETC spring is not ok or if the ETC mechanism is blocked.

P1615

The position of the ETC is not plausible. The throttle mechanism may be blocked. The circuit wires ETC-3 or ETC-5 may be shorted to ground or shorted together. The ETC motor is short-circuit.

Learning Key

The Ski-Doo™ learning key limits the torque and speed of the snowmobile therefore enabling first time users and less experienced operators to learn how to operate the snowmobile while gaining the necessary confidence and control.

Limitations

The ability of a novice to operate the snowmobile can be exceeded even when a learning key is used.

Refer to *OPERATING MODES* subsection for details.

OPERATING MODES

ECO Mode (Fuel Economy Mode)

When ECO mode is selected (fuel economy mode), vehicle torque and speed are limited whereby an optimal cruising speed is maintained in order to reduce fuel consumption.

Once activated, ECO mode will remain active until it is deactivated by the operator.

Standard Mode

A Standard mode indicator is ON in the multifunction gauge to confirm the active mode of operation.

Sport Mode

WARNING

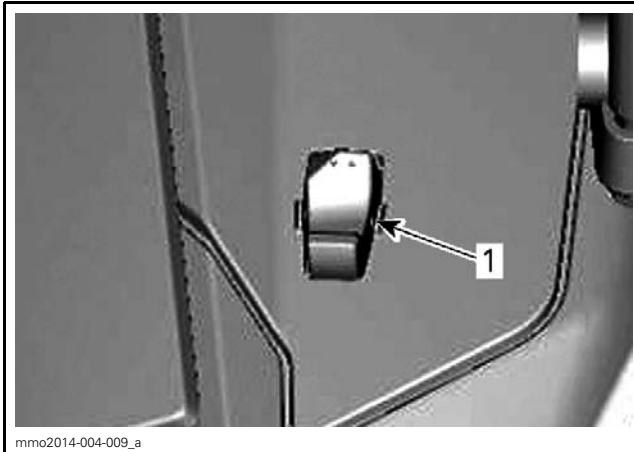
Ensure passenger is advised to hold on tightly before activating Sport mode. Sport mode provides increased acceleration.

When selected, Sport mode provides for instant throttle response and more rapid accelerations than Standard or ECO mode.

Navigating Operating Modes

Use ECO/Standard/Sport Mode switch to navigate between power levels, from ECO (reduced power) to Standard (full power) to Sport (increased power).

To increase power, press the switch upwards. To decrease power, press the switch downwards.

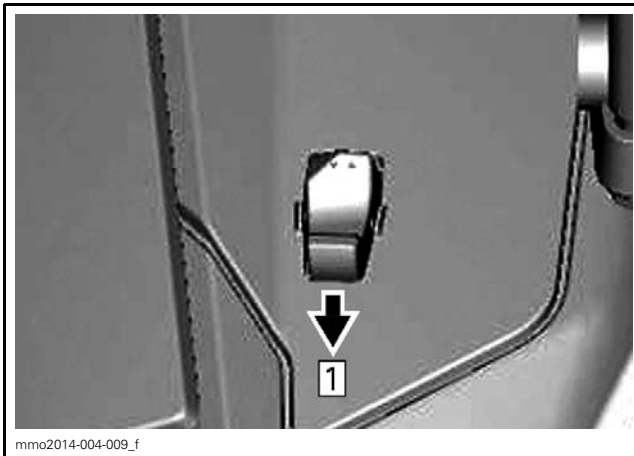


TYPICAL - LH SIDE OF FUEL TANK
1. Mode switch

To activate Standard mode when in Sport mode, press bottom end of switch once.

To activate ECO mode when in Sport mode, press bottom end of switch twice.

To activate ECO mode when in Standard mode, press bottom end of switch once.



TYPICAL
Step 1: Press bottom end of switch

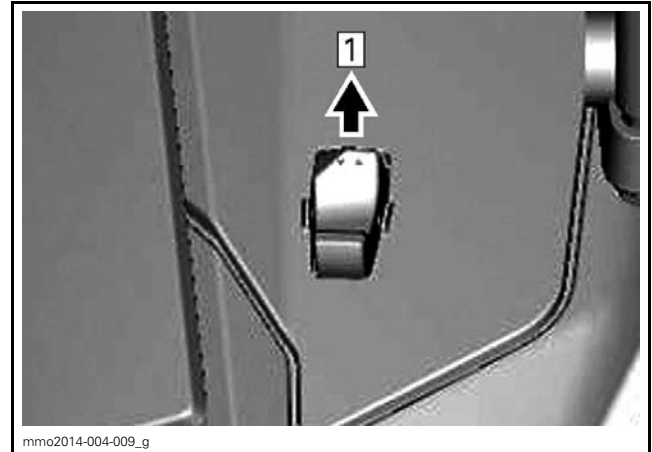
⚠ WARNING

Ensure passenger is advised to hold on tightly before activating Sport mode. Sport mode provides increased acceleration.

To activate Sport mode when in Standard mode, press top end of switch once.

To activate Sport mode when in ECO mode, press top end of switch twice.

To activate Standard mode when in ECO mode, press top end of switch once.



TYPICAL
Step 1: Press top end of switch

⚠ WARNING

When adjusting modes, be sure to maintain situational awareness of other snowmobiles, obstacles, or persons .

Learning Key Modes

The learning key provides a mode of operation whereby engine torque and speed are limited.

NOTE: The initial learning key programming can limit the speed to 40 km/h (25 MPH) or 70 km/h (43 MPH).

There are 3 levels available for the learning key mode.

Changing Learning Key Settings

To change learning key setting, carry out the following:

1. Press the START/electronic reverse button to wake up the electrical system and install the NORMAL key on the engine cut-off switch.
2. Wait for the multifunction gauge to complete its self-test and display the key recognition message.

Analog/Digital Gauge

3. Press the SET button until LEARN is visible in the digital screen of the multifunction gauge.

Subsection 02 (INTELLIGENT THROTTLE CONTROL (iTC))

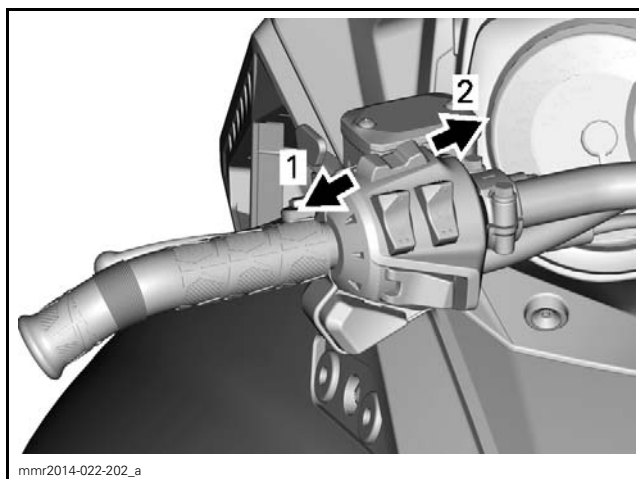


ALL MODELS EXCEPT GSX AND GTX

1. SET function

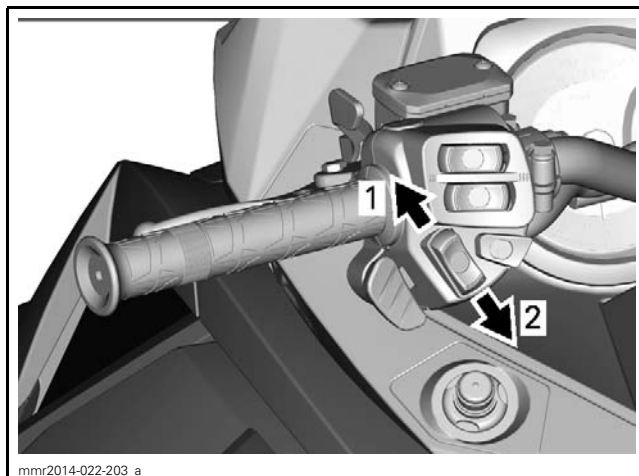
Multifunction Analog/Digital Gauge

4. Press the MODE button once, then press the SET button until LEARN is visible in the digital center of the gauge.



GSX MODELS - MULTIFUNCTION SWITCH

1. MODE function
2. SET function

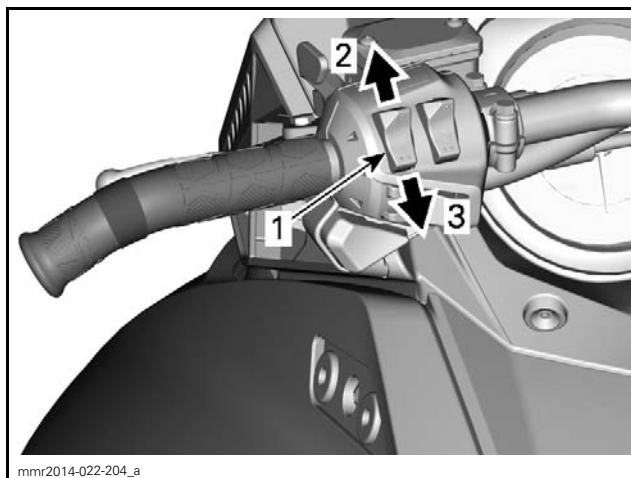


GTX MODELS - MULTIFUNCTION SWITCH

1. MODE function
2. SET function

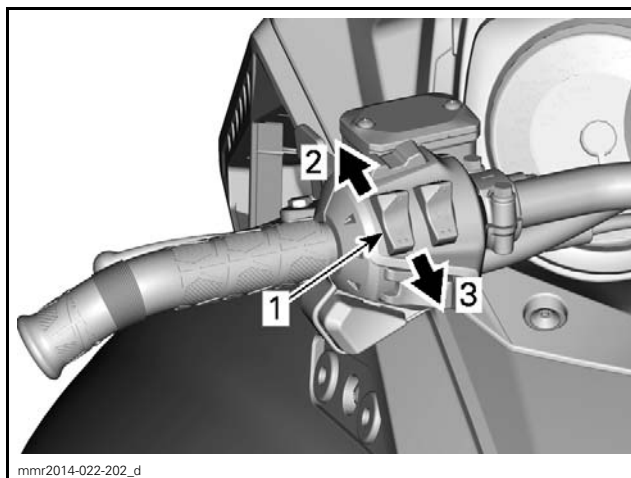
All Models

5. Use the heated grip switch to toggle the key setting between 1 and 3.



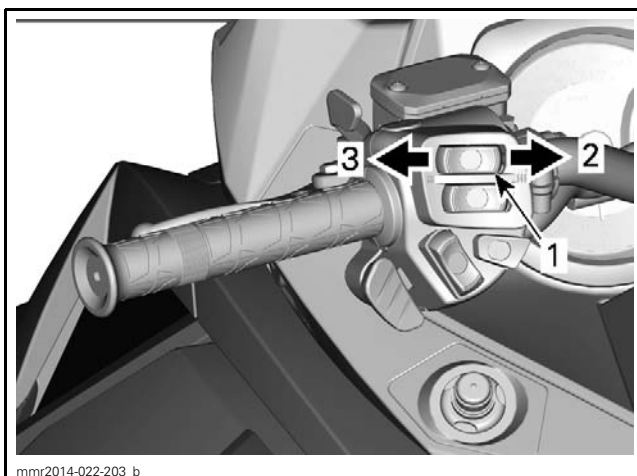
ALL MODELS EXCEPT GSX AND GTX

1. Heated grips switch
2. Increase
3. Decrease



GSX MODELS

1. Heated grips switch
2. Increase
3. Decrease



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GTX MODELS

1. Heated grips switch
2. Increase
3. Decrease

NOTE: Setting 1 is the lowest available torque, while setting 3 is the highest available torque for learning key.

6. After a few seconds, the setting is automatically confirmed and saved.

NOTE: The key speed setting is applicable to any key of the same type used on a specific snowmobile. The same key type used on a different snowmobile may therefore have a different key speed setting.

NOTE: Vehicle performance may vary depending on riding conditions.

PROCEDURES

THROTTLE ACCELERATOR SENSOR (TAS)

General

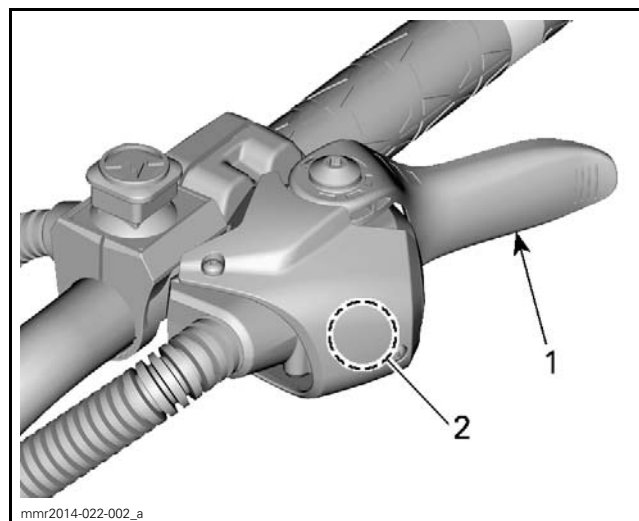
The throttle accelerator sensor (TAS) is a double hall effect sensor, which translates the position of the lever into two analog voltage and sends a signal to the ECM which is proportional to the throttle lever angle.

These Hall effect sensors are powered by the ECM with a voltage of 5.0 volts.

The signals given by these sensors vary from 0.6V to 2.97V for (SIGNAL 1) and 0.3V to 1.49V for (SIGNAL 2).

The relation between these two signals is (Signal 1) = (Signal 2) X 2.

If a problem occurs with any of these signals then a diagnostic fault code will be generated.



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1. Throttle lever
2. Throttle accelerator sensor (TAS)

First ensure the throttle lever functions adequately. Apply throttle lever fully then release it. It must reach the wide open position and return to the idle position freely when released. Otherwise, refer to *STEERING SYSTEM* for an inspection.

TAS Fault Codes

P0122

Signal 1 on connector TAS-F is too low. The minimum voltage allowed for this signal is 0.6 volt.

An unplugged TAS connector will trigger this fault.

A missing 5 volt supply on circuit wire TAS-D will trigger this fault.

If one of these wires is shorted to ground the fault will show.

P0123

Signal 1 on connector TAS-F is too high.

The maximum voltage allowed for this signal is 2.97 volts.

When the ECM is powered a TAS position check is performed and if the signal is too high this fault will show.

Check if the lever position is at its minimum.

P0222

Signal 2 on connector TAS-C is too low.

The minimum voltage allowed for this signal is 0.3 volt.

An unplugged TAS connector will trigger this fault.

A missing 5 volt supply on circuit wire TAS-D will trigger this fault.

Subsection 02 (INTELLIGENT THROTTLE CONTROL (iTC))

If one of these wires is shorted to ground the fault will show.

P0223

Signal 2 on connector TAS-C is too high.
The maximum voltage allowed for this signal is 1.49 volts.

Also when the ECM is powered a TAS position check is performed and if the signal is too high this fault will show.

Check if the lever position is at its minimum.

P060D

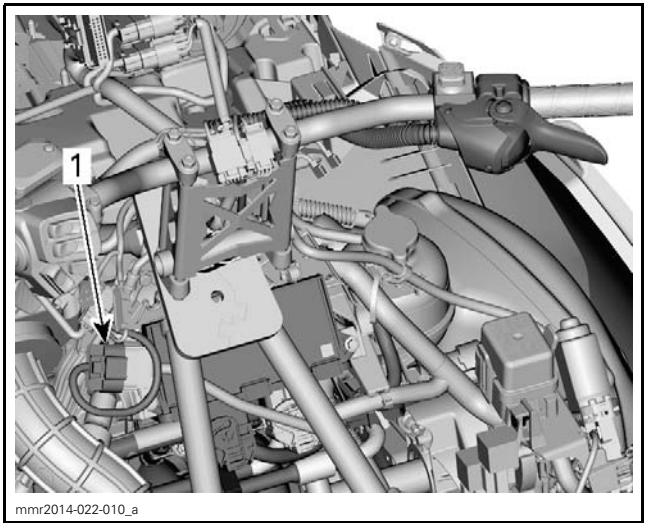
The ratio of signal 1 and signal 2 is 2:1 for any lever position.

For example: (signal 1 = 0.6 volt) and (signal 2 = 0.3 volt) at the minimum position. (signal 1 = 2.97 volt) and (signal 2 = 1.49 volt) at the maximum position.

If any of these two signals is different than the expected value this fault will show.

TAS Voltage Test

Disconnect TAS connector and measure voltage on the main harness side.



1. TAS connector to disconnect

TAS CONNECTOR TEST	
Pin	Voltage
B to A	5V
D to E	5V

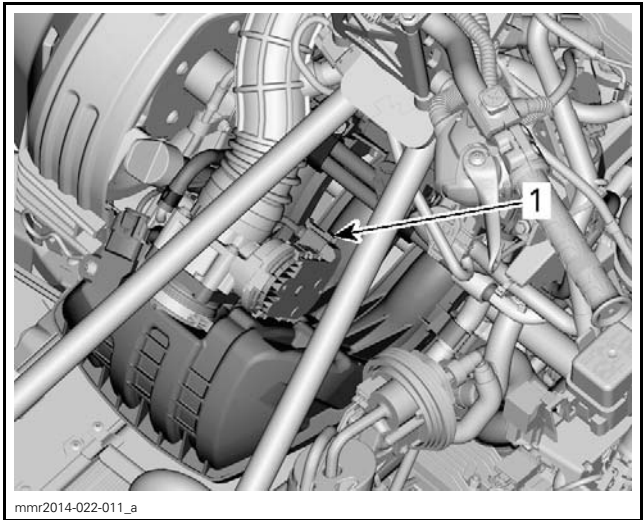
If not 5V, ECM might be defective, oxidation might be present in circuits or terminals might not have good contact.

Reconnect TAS connector and backprobe to measure voltage.

If 2 for 1 relation is not met for signal 1 and 2 ratio, then TAS sensor is defective. Refer to *TAS REPLACEMENT* in this subsection for replacement procedure.

ETC Voltage Test

Disconnect ETC connector and measure on the engine harness.



ETC CONNECTOR

ETC CONNECTOR TEST	
Pin	Voltage
6 to 2	3.3V

If not 3.3V, ECM is might be defective, oxidation might be present in circuits or terminals might not have good contact.

Reconnect ETC connector and backprobe to measure voltage.

If (Signal 1) + (Signal 2) does not equal 3.3V, then the ETC is defective. Refer to *ETC REPLACEMENT* in this subsection for replacement procedure.

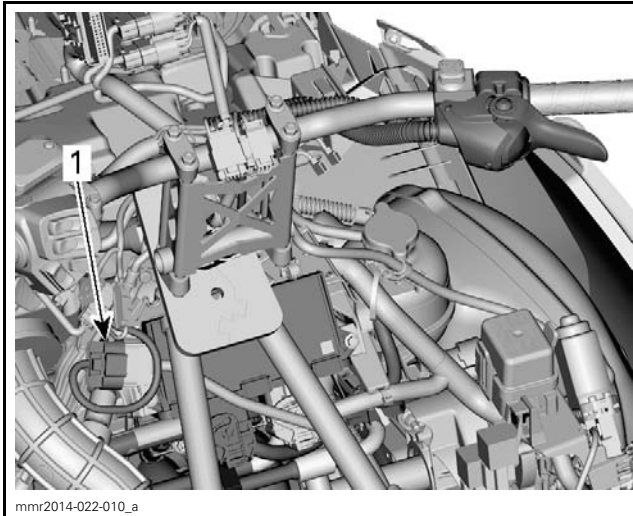
ETC Replacement

The ETC comes assembled with the complete throttle body unit.

To replace throttle body assembly. Refer to *A/R INTAKE SYSTEM*.

TAS Replacement

1. Remove throttle lever housing from vehicle.
Refer to *STEERING SYSTEM* and note harness routing.
2. Disconnect TAS connector.



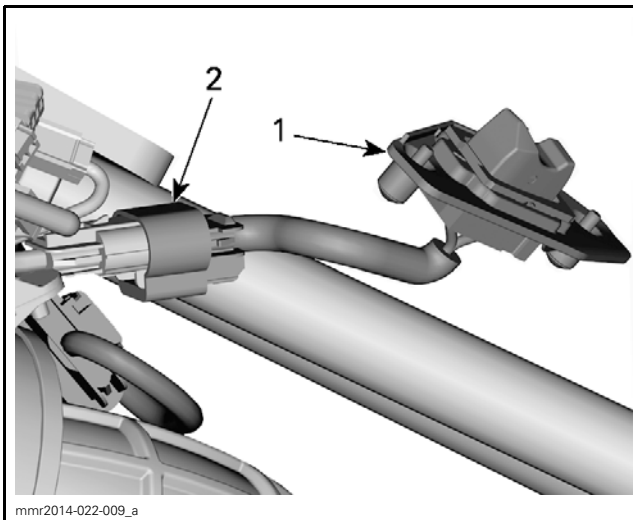
1. TAS connector to disconnect

3. Replace TAS connector

DRIVING MODE SWITCH

Driving Mode Switch Operation Test

1. Remove the console.
2. Disconnect the driving mode switch connector.



1. Driving mode switch
2. Driving mode switch connector

3. Set multimeter to Ω .
4. Test the driving mode switch for continuity as per following table.

DRIVING MODE SWITCH CONNECTOR TEST		
Position	Pin	Resistance
UP	B to A	0 Ω
Released	B to A	Infinite (OL)
DOWN	B to C	0 Ω
Released	B to C	Infinite (OL)