

# Service Bulletin

September, 2001

Bulletin No: 13 003 01 (022)

## BMW Motorcycles

Subject: **F 650 GS/Dakar driveability issues**

Operating Manager

**Overview:** Reports of driveability issues such as, "tendency of the engine to stall when coming to a stop or pulling away" still continue.

Sales Department

In an effort to address and communicate information, this bulletin provides:

Accessory Department

Parts Department

Service Department

1. Review of proper F 650 GS engine starting procedures.
2. Diagnosis and Service Measures. Diagnosis begins with verifying the customer complaint, reading fault codes, updating the BMS C control module (if possible). Continued diagnosis is then directed by a 10 point checklist and service measure information table. All of this information is provided on the following attachments.

- A. BMS C Program Updating Information.
- B. A table of possible causes contributing to a drivability complaint with associated service measures.
- C. A 10 point checklist to be completed during motorcycle diagnosis. The check list will ensure consistent data for BMW NA review and provides a concise sheet for easier QEW entry on MTAS.

**F 650 GS Engine Starting Procedure:** F 650 GS engine operation is managed by a sophisticated engine management system; **BMS C** (BMW Motor Steuergerät [controller], Compact). BMS C manages the fuel injection enrichment time and ignition timing during engine start up. It is essential that this starting procedure is followed with every starting sequence to ensure proper operation.

1. Switch the ignition on, ensure the kill switch is in the run position. Do not touch the throttle until after engine is running and idling.
2. Do Not Press Start Button for at least 1 second. This brief time period allows the BMS C to monitor it's input data (temperatures, battery voltage, throttle position) and prepare for optimum engine starting.
3. Press and hold the Start Button, do not release until engine is running and idling. To prevent kickback, the BMS C will immediately interrupt ignition if the start button is released during engine start up. The customer could misinterpret this protective function as "difficulties starting the engine." Inform your customers that holding the start button down "too long" will not result in damage to the starter motor.

Always review and demonstrate this procedure when an F 650 GS is delivered or returned to a customer after service. Always consider improper starting as a possible source of customer complaints. Review this process before you diagnose.



**Diagnosis and Service Measures:** **Verify Customer Complaint:** Before diagnosing, test ride the motorcycle to personally verify the customer's complaint. If not verifiable, interview the customer and document when, where and under what conditions the customer's driveability issues occur. Use the "description of concern" area of the QEW Entry Information section on "**Attachment C**" of this bulletin for this purpose.

**Fault Code Memory:** After your test ride, read the BMS C fault-code memory with the MoDiTeC. Use the "description of concern" area of the QEW Entry Information section on "**Attachment C**" to note fault codes and/or values for:

- Battery voltage
- Road Speed Signal
- Engine Speed Signal
- Fuel Injector valve
- Idle Control Actuator

If faults are found, perform guided diagnosis via the MoDiTeC for the identified fault. Once corrected, test ride the motorcycle to determine if the initial customer complaint has been eliminated.

**BMS C Programming:** With the most recent software loaded, use MoDiTeC to initiate a BMS C program update. If an update was performed, follow up with a test ride to verify if the update fixed the initial complaint.

Refer to "**Attachment A**"; BMS C Program Update Information for additional information.

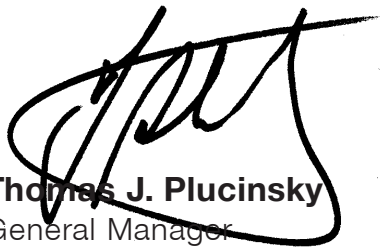
**Possible Cause/Service Measures (Attachment B) & Driveability Check List (Attachment C):** These attached documents provide a set course of action to help your diagnosis. Take accurate readings during diagnosis, make accurate adjustments and note your findings on the Driveability Checklist and ultimately into the QEW online report.

**Warranty Reimbursement: THIS IS NOT A SERVICE ACTION.**

This information is provided to address customer satisfaction issues as they are brought to the attention of your workshop.

Warranty coverage for the diagnosis and repair described above can be applied to F 650 GS motorcycles still under coverage of the standard 3 year, 36,000 mile Limited Warranty.

For warranty reimbursement, file a regular warranty claim, using the appropriate defect and flat rate codes.



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# BMS C Program Updating Information

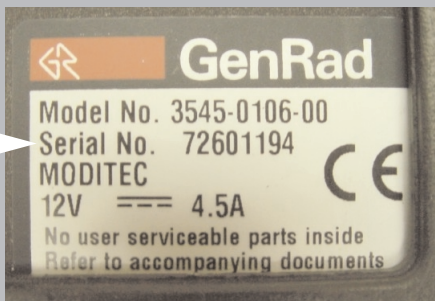
*Prior to performing the BMS C update, make sure the battery is fully charged and disconnect fuse 2. As a tip, connect a battery charger to ensure adequate voltage.*

## BMS C Update Procedure

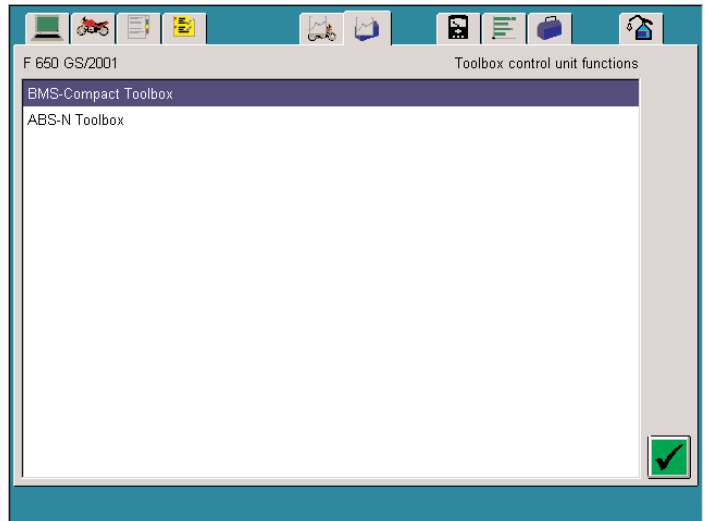
- Enter the VIN of the Motorcycle from the VIN entry screen.
- Select the Toolbox Control Unit functions tab from the top
- Launch the BMS Compact Toolbox as shown and press the green check.
- Select “Programming of the BMS Compact control unit” as shown and press the green check.

**Note:** If the motorcycle is the first to be programmed after loading the latest version MoDiTeC software, the MoDiTeC serial number must be entered via the touch screen.

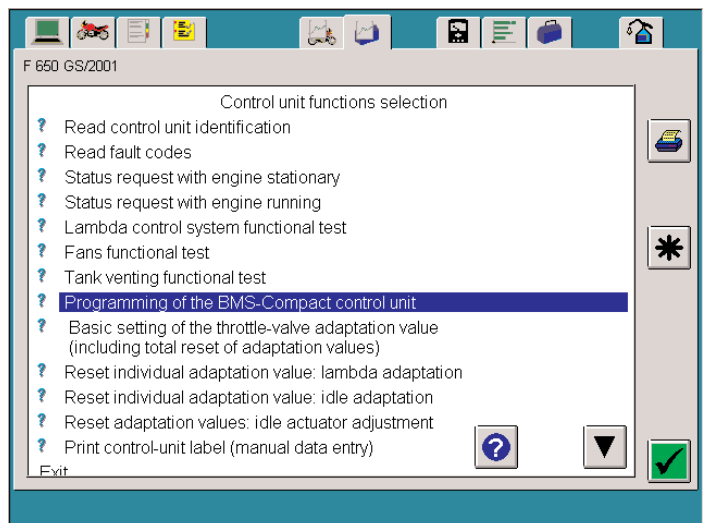
The serial number is found on a label on the back of the MoDiTeC. Once entered, press the green check.



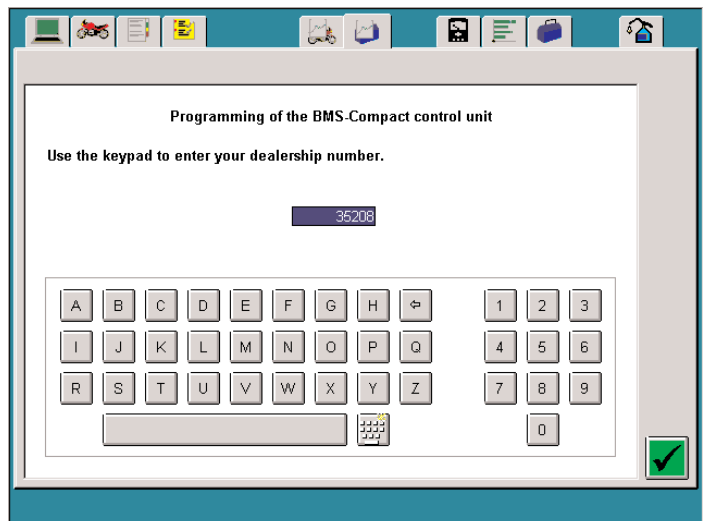
- Enter your dealer number, press the green check.



Toolbox control unit functions



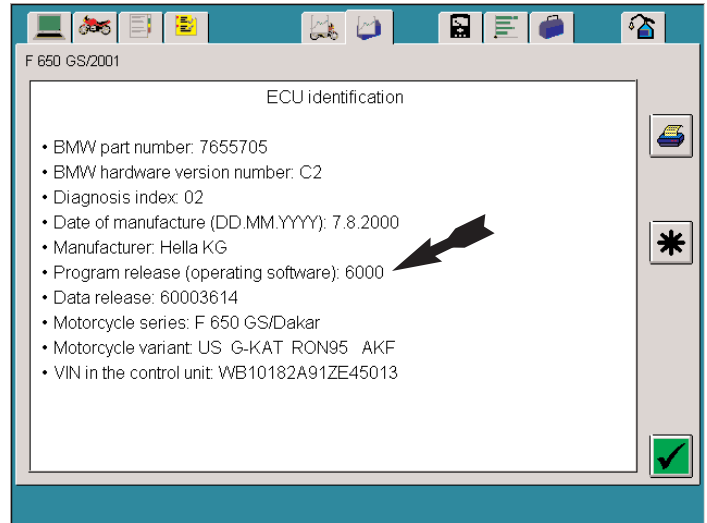
Control unit functions selection menu



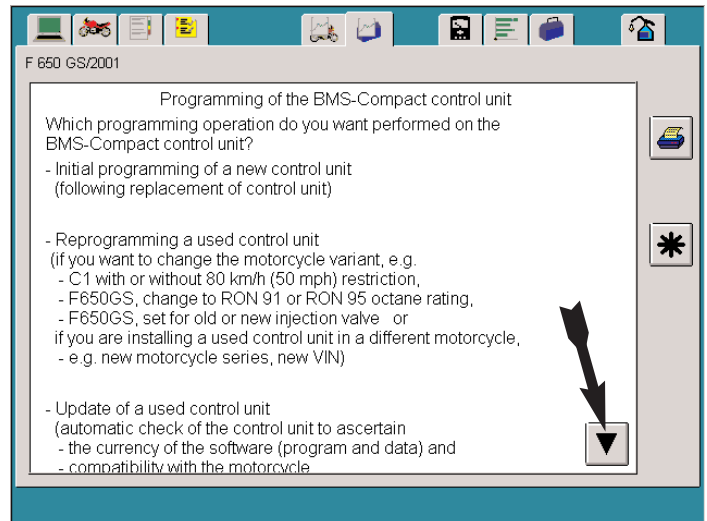
Dealer Number Entry



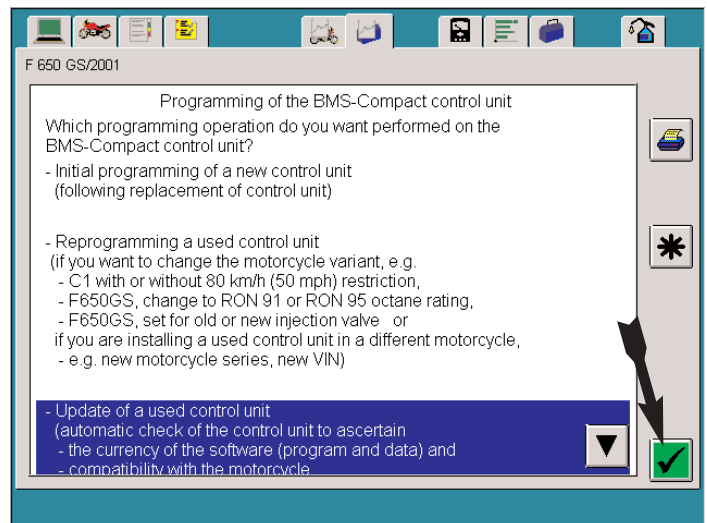
- The MoDiTeC then informs it will display the current control unit ID page. Press the green check.
- Review the ECU Identification page and note the Program Release (operating software) number. Press the green check.
- When update or reprogramming is completed make sure this number has been changed in the ECU ID page.
- The next screen provides selection of:
  1. Initial programming (new control unit).
  2. Reprogramming a used control unit.
  3. Update of a used control unit.
- Review the information specific to all the selections. Press the down arrow to review the additional information below.
- As noted, once you select Reprogram or Update, the action is started automatically and can not be cancelled. The time required to perform an update or reprogram takes a maximum of 20 minutes.
- When ready, select **“Update a used control unit”**. Press the green check to begin.
- The MoDiTeC will then interrogate the BMS C to determine the installed software version. Based on the MoDiTeC conclusion, proceed as required.
  - Proceed if update is possible (go to next page.)
  - End update procedure if not possible and close MoDiTeC BMS Toolbox.



ECU Identification Page



Program/Update selection menu



Program/Update selection menu

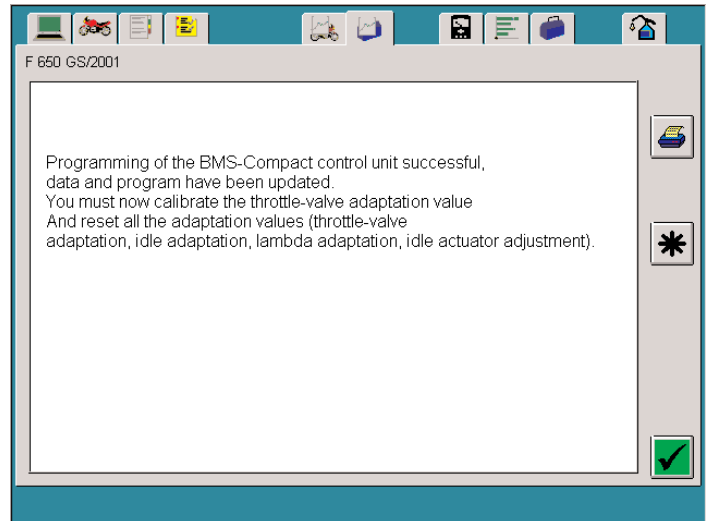


- When the update/reprogramming procedure is active, do not switch the ignition off or twist the throttle grip.
- The MoDiTeC will indicate when the update procedure is completed. This screen also indicates that the next step will calibrate the throttle valve adaptation, and reset all adaptation values. Press the green check
- The MoDiTeC then indicates that the calibration and reset of adaptation values has been completed successfully.
- The note provides very important information specific to throttle cable adjustment and initial learning for Idle Actuator adjustment adaptation values.

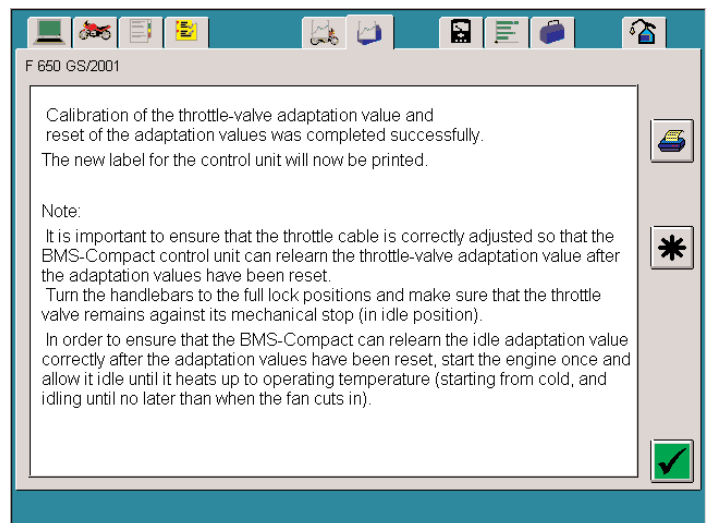
Idle air actuator operation is primarily based on engine temperature. Allowing the engine to warm up completely until the cooling fan activates allows the BMS C to build it's reference values for air actuator operation.

This warm up phase must be performed at idle without touching the throttle.

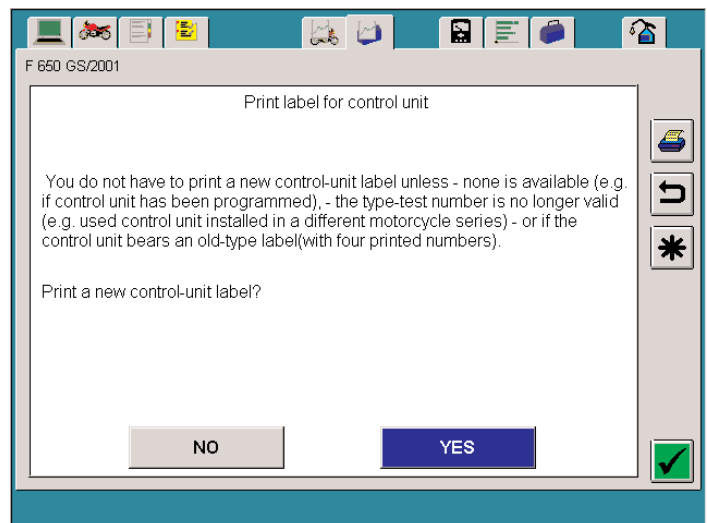
- With the introduction of MoDiTeC CD 10 software, a new BMS C ID label format is also introduced. The new label has two lines of information compared to the previous format which had four.



Calibration and Adaptation Note



Calibration and Adaptation Clearing Successful

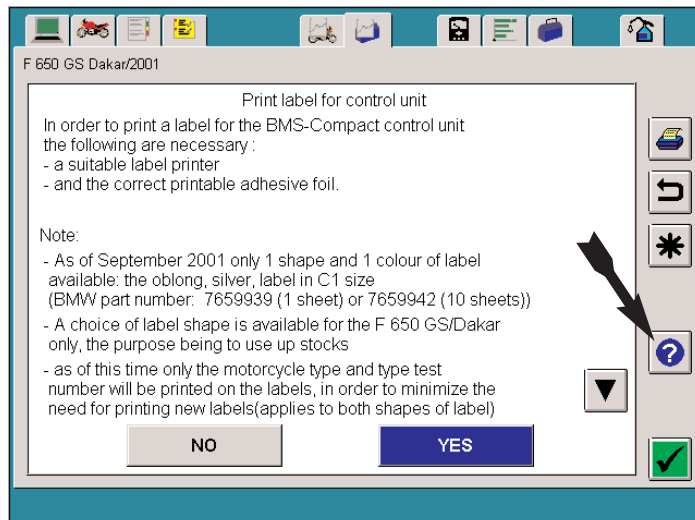


Label Printing Notification

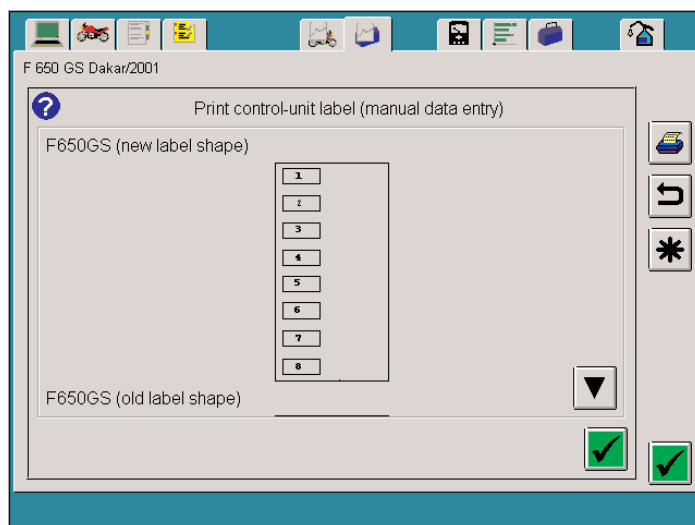


- The new format allows the use of a smaller label:  
 1 sheet (8 labels): P/N 13 61 7 659 939  
 10 sheets (80 labels): P/N 13 61 7 659 942
- There are 8 labels to a sheet compared to 5 per sheet from the previous type. The labels are available in silver only (yellow is no longer used). Silver is now used for both update and programming.
- The ModiTeC allows printing on the old style labels to use up existing stock. This is accomplished by selecting the style of labels you have on hand. Refer to the help screen by pressing the ?.
- When printing, the label is inserted into the printer face up, head first.
- Follow all onscreen printing instructions to generate the label. Make sure you cover the label with the clear adhesive covering located on the right side of the label sheet.
- As a final check, open the ECU ID page. Compare the operating software to the version you noted in the beginning of this process, it must be a newer generation than the original.

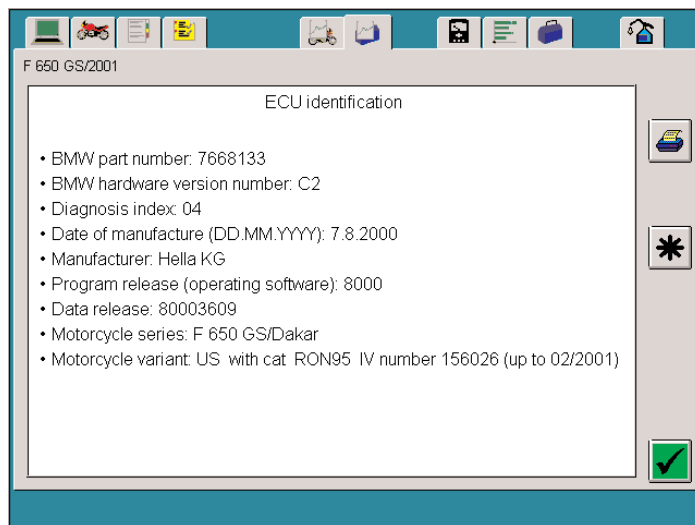
-- End of Update Process --



Help Screen for label information



Help Screen



ECU Identification Screen



## Service Checks

Review the numbered possible causes that could contribute to driveability issues. This chart is to be used along with the two page check sheet (Attachment C).

#	Possible Cause	Service Measure
1	Clutch plates not separating completely when lever is pulled in. (Cable adjustment or oil viscosity too high).	Check for proper clutch cable adjustment. If necessary, change engine oil to an API SH 15W-40 or 10W-40 grade. <b>Note:</b> API <u>SJ</u> specification is <u>not</u> approved for wet clutches.
2	Fuel pressure out of tolerance.	The specification for fuel pressure is 3.5 +/- 0.2 bar. Replace the fuel filter/regulator as necessary to correct fuel pressure to this specification (either too high or too low). Check the fuel pressure once the new filter/regulator has been installed to ensure the value is now within spec.
3	Loose battery contacts	Tighten battery contacts.
4	Slight Corrosion on BMS-C connections.	Unplug BMS C control unit connector and check for signs of slight corrosion/oxidation. Replace as necessary.
5	BMS-C internal capacitor defective. Battery voltage not correctly detected.	<p>Using MoDiTeC, read the monitored battery voltage in the BMS C toolbox (BMS C Status Requests with Engine Stationary) while simultaneously checking direct battery voltage with a voltmeter.</p> <p>Do this check with the engine off and at idle. The measured voltage readings should not differ by more than 1.5 volts in either test.</p> <ul style="list-style-type: none"> <li>• If within range, go to step 6 on next page</li> <li>• If not, continue below.</li> </ul> <p>Measure voltage at BMS C multi pin connector  <b>Pin 9</b> - Negative Meter lead (-)  <b>Pin 28</b> - Positive Meter lead (+) Make sure kill switch is in the run position, the side stand is in the up position and the key is on.</p> <p>If measured value is less by more than one volt compared to direct battery voltage, diagnose circuit. Wiring or switch voltage drop is probable cause (This is checked in step 8)</p> <p>If it is same as battery voltage, replace the BMS-C control unit. Complete this test again with the new BMS C installed to ensure that battery voltage through the control unit is now within specification.</p>





6	Intermittent fault in the clutch switch, neutral switch, side stand switch or kill switch.	Using the F 650 GS/Dakar electrical circuit diagrams book (P/N 01 99 0 015 915), diagnose circuits to ensure proper function of components and circuits.
7	False or obstructed air. <ul style="list-style-type: none"> <li>• Cracks/leaks in the rubber intake manifold boot.</li> <li>• Assembly grease in the idle actuator duct in the throttle housing.</li> </ul>	Inspect rubber intake manifold for cracks or air leaks on base of manifold.  The idle actuator regulates idle air through a duct, which bypasses the closed throttle plate in the throttle housing. Assembly grease used to assemble the air boot to the top of the throttle housing can possibly obstruct the air path, and cause the engine to stall. Remove the air box and idle control valve. Inspect duct for debris, clean as required.
8	Throttle cable setting incorrect (throttle valve not closing at idle),	Adjust throttle cable (audible “click” when throttle valve is at limit position; also when handlebars are turned to full lock position).
9	Intermittent fault / inaccurate signals from the rear wheel speed sensor.	The BMS-C can perceive inaccurate wheel speed from a defective rear wheel speed sensor. If this occurs, the BMS C can make adjustments to the fuel air mixture that are inappropriate to the actual engine/rear wheel RPM relationship that could cause engine stalling.  Check the plug contacts, the sensor and the speedometer signal; replace defective parts as necessary.  If the motorcycle is equipped with ABS, use MoDiTeC to read the wheel speed signal in the ABS toolbox, ABS Status Queries, environment.  <b>MoDiTeC Note:</b> The F 650 GS uses active wheel speed sensors. Active sensors are semi conductor components that cannot be measured for resistance. Disregard any tests in MoDiTeC that direct you to measure their resistance.
10	Engine Speed Sensor gap	This sensor is fixed to the inside of the right side case cover. There is no method of adjustment but this should be checked to ensure the mounting is not defective. If adjustment is out of spec, disassemble case and determine what is causing incorrect gap. Replace parts as necessary.  Specified gap = $0.7 \pm 0.5$ mm (negative tolerances produce better results)





# F 650 GS/Dakar

## Driveability Issues Checklist



On completion of this checklist, your findings must be entered into the Quality Early Warning (QEW) system in the Service section of MTAS. The QEW Entry Information at the top of this form must be entered into the QEW report in order to save the data to the system (enter data in all fields).

### QEW Entry Information:

Technician Name: \_\_\_\_\_  
 Model: \_\_\_\_\_ Date M/C Received: \_\_\_\_\_  
 VIN: \_\_\_\_\_ Date of Sale: \_\_\_\_\_  
 Mileage: \_\_\_\_\_ Engine Number: N/A  
 Paint (Finish) Code (on label under seat): \_\_\_\_\_ Transmission Number: N/A  
 Defect Code: \_\_\_\_\_ Date of Report: \_\_\_\_\_  
 Description of Concern: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Describe Solution: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

List Parts Used in Solution: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

### 10 Point Checklist:

1. Clutch Dragging? Does clutch fully disengage when the lever is pulled in? Yes  No

If No, refer to page 00.26 (sequential page 44) of the F 650 GS Repair Manual, follow procedure 13 60 505 to check clutch adjustment.

After adjusting, does clutch fully disengage? Yes  No . If yes, proceed to next item, if no, change engine oil to correct viscosity (15W-40 or 10W-40). Higher viscosity engine oils (20W-50) can prevent full clutch disengagement on an F 650 GS due to its design.

2. Fuel Pressure? Refer to Repair Manual page 13.9 (sequential page 135). Connect the MoDiTeC pressure sensor kit to the fuel hose in place of the pressure gauge shown in Repair Manual. Use the MoDiTeC Multimeter application to measure fuel pressure, Start engine and idle, record pressure.

Measured value: \_\_\_\_\_ bar. Is this value less than 3.3 or more than 3.7 bar? Yes  No .

If No, go to next item. If Yes, check fuel supply and return lines for obstructions. If no obstructions are present, replace fuel filter/pressure regulator. After replacement, recheck fuel pressure. Fuel Pressure must be within specification (3.5 +/- .2 bar).

3. Loose Battery Contacts? Yes  No . If battery contacts are found loose, clean and retighten.

4. Corrosion on BMS C Connector? Yes  No . If yes, what component(s) did you replace:  
 \_\_\_\_\_

**Driveability Issues Checklist, Page 2**

**VIN:** \_\_\_\_\_

5. Is BMS C Monitoring Battery Voltage Correctly? This check requires reading voltage using a Voltmeter set to DC Volts connected to the battery terminals, and the MoDiTeC connected to the Diagnostic Connector. Perform check as outlined in the proceeding table, #5.

<b>Engine Off,</b>	Voltage reading at Battery	➔	<input type="text"/>	<b>Volts</b>
	Voltage displayed on MoDiTeC, (Battery Voltage, Terminal 15:)	➔	<input type="text"/>	<b>Volts</b>
	(Found in BMS C Toolbox, Status Requests with engine stationary)			
	Subtract MoDiTeC Value from Voltmeter reading =	➔	<input type="text"/>	<b>Volts</b>
<b>Engine Idling,</b>	Voltage reading at Battery	➔	<input type="text"/>	<b>Volts</b>
	Voltage displayed on MoDiTeC, (Battery Voltage, Terminal 15:)	➔	<input type="text"/>	<b>Volts</b>
	(Found in Status Requests with engine stationary)			
	Subtract MoDiTeC Value from Voltmeter reading =	➔	<input type="text"/>	<b>Volts</b>

Are the values in either of the gray boxes + **1.5 volts or higher**? Yes  No  . If No, go to next check, #6, If Yes, continue on next line.

Disconnect the BMS C control unit, use the proper probe adapters to measure the voltage at pin 28 of the BMS C control module harness connector. Use pin 9 as your ground connection.

Voltage reading at Battery	➔	<input type="text"/>	<b>Volts</b>
Voltage at pin 28 of BMS C connector	➔	<input type="text"/>	<b>Volts</b>
Subtract Pin 28 reading from battery reading	➔	<input type="text"/>	<b>Volts</b>

Is the value in the gray box **1 Volt or higher**? Yes  No  .

If **No**, replace BMS C control module and retest (see proceeding table, step #5.)  
 If **Yes**, the probable cause is a voltage drop in the wiring or switches providing ignition switch voltage (terminal 15) to the control unit. Diagnose circuits as directed in check #6 below.

6. Are electrical switches and circuits functioning correctly? Refer to the wiring diagram VII & V. Determine what circuits to diagnose (ignition switch to combination start/kill switch, Motronic relay, side stand switch, etc). Perform voltage drop test across switches while operating.

Are all switches and circuits functioning correctly? Yes  No  . If yes continue to check #7, If No, replace/repair faulted component.

7. Is the idle air path clear? Refer to procedure in table, #7.

Is the air passage clear and free of debris? Yes  No  . If yes, continue to check #8, If no clean air duct of debris, reassemble and recheck for driveability complaint.

8. Is the throttle cable adjusted correctly? Refer to procedure in table, #8.

Is the cable free play adequate? Yes  No  . If yes continue to check #9. If no, adjust as specified in the repair manual.

9. Is wheel speed sensor functioning correctly? Refer to procedure in table, #9

Do the speed sensor and wiring function correctly? Yes  No  If yes continue to check #10, If no replace/repair faulted component.

10. Is the engine speed sensor gap correct? Refer to procedure in table, #10.

Using a feeler gauge, measure sensor gap which is accessed through threaded hole in right side case cover. Is the air gap correct? Yes  No  . If no, remove right side case cover and replace components to accommodate correct clearance.