

**\*MANDATORY SERVICE BULLETIN\*****NUMBER:** SB12-04**REVISION:** 00**DATE:** May 31, 2012**SUBJECT:** KODIAK 100 Fuel Quantity Calibration**EFFECTIVITY:**

All KODIAK 100 Series Aircraft; see Compliance section below for details of applicability.

**SUMMARY:**

Quest Aircraft has received several reports of inaccurate fuel indication, including reports that indicated fuel quantity was greater than zero when in fact there was no usable fuel remaining. This Mandatory Service Bulletin requires compliance with the attached Field Service Instruction (FSI-043), and additionally requires removal and replacement of applicable pages of AM901.0 POH/AFM. FSI-043 provides instructions for the re-calibration of the Electric Fuel Quantity Indicators, including an update to the G1000 configuration file for improved fuel quantity indication system accuracy. The Revision 10a pages for AM901.0 inform pilots of new limitations and requirements for visual verification of the fuel quantity prior to flight.

**COMPLIANCE:**

This Mandatory Service Bulletin must be complied with on or before the next 100 Hour or Annual inspection, whichever comes first; in the interim, the WARNING dated April 19, 2012 and issued to all customers and operators remains in effect. Compliance requirements for various serial number ranges are as follows:

Aircraft Serial Numbers 100-0001 through 100-0068: one-time completion of FSI-043, and replacement of applicable pages of the AM901.0 POH/AFM with the provided Revision 10a pages.

Aircraft Serial Numbers 100-0069 through 100-0070: replacement of applicable pages of the AM901.0 POH/AFM with the provided Revision 10a pages.

All KODIAK 100 Aircraft: for all future fuel quantity calibrations, the instructions provided in FSI-043 supersede the instructions provided in the AM902.0 AMM until this Mandatory Service Bulletin is rescinded.

**ATTACHED DOCUMENTS:**

Document #:	Revision:	Document Title:
FSI-043 AM901.0	00 10a (replacement kit)	Fuel Quantity Calibration Procedures KODIAK 100 Pilot's Operating Handbook / Airplane Flight Manual

**FAA APPROVAL STATUS:**

The instructions attached to this Service Bulletin have demonstrated compliance with all applicable Federal Aviation Regulations and are approved by the Federal Aviation Administration.

**CREDIT AND WARRANTY INFORMATION:**

For airplanes still under warranty, Quest Aircraft Company will reimburse for the cost of this modification up to \$340.00. For reimbursement send Quest Aircraft Company a copy of the maintenance record, completed KODIAK 100 Warranty Claim Form, and an invoice that does not exceed the amount listed above.

**Quest Customer Service****Service Bulletin: SB12-04****Phone: (208)263-1111 Toll Free: 1(866)263-1112****Email: [Customercare@questaircraft.com](mailto:Customercare@questaircraft.com)****SPECIAL INSTRUCTIONS:**

N/A

**\*MANDATORY SERVICE BULLETIN\*****\*MANDATORY SERVICE BULLETIN\***



TITLE:

SERIAL RANGE:

**FIELD SERVICE INSTRUCTION**

Fuel Quantity Calibration Procedures

All KODIAK 100 Aircraft

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**SUBJECT**

This Field Service Instruction provides guidance for the fuel quantity calibration of the KODIAK 100.

**AFFECTED MANUALS AND PUBLICATIONS**

None

**INDUSTRY REFERENCES**

None

**WEIGHT AND BALANCE**

Negligible

**MANPOWER**

The estimated man-hours and minimum number of persons required to perform this Field Service Instruction are listed below. The "Minimum Persons" refers only to maintenance personnel or installers, and unless otherwise specified within this instruction does not include additional personnel that may be needed solely to comply with safety requirements (for example, safety observers that are not performing tasks within this instruction). It is the responsibility of maintenance personnel to comply with safety requirements, including having a safety observer available as needed.

**Estimated Man-hours: 4 hours**

**Minimum Persons: 1 person**

If more than the minimum personnel perform this instruction, the actual man-hours required may be reduced due to increased efficiencies. As appropriate, Quest encourages the use of additional personnel; man-hour estimates are based on the minimum personnel required.

**RECORD OF COMPLETION**

Update the appropriate maintenance records.

Quest Aircraft Company, LLC  
1200 Turbine Drive  
Sandpoint, ID 83864



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## REVISION RECORD

REV	PAGE	CHANGE DESCRIPTION
00	All	Initial Release



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## 1. Special Safety Instructions

### 1.1 Warnings

Failure to comply with “Warnings” contained in this instruction may result in financial loss, significant delay in the completion time, and/or serious injury to personnel.

### 1.2 Cautions

Failure to comply with “Cautions” contained in this instruction may result in the destruction of components, unnecessary complications, the need to reverse completed work, and/or delays in the completion time.

### 1.3 Notes

“Notes” are provided when additional information may lead to an increase in efficiency.

## 2. Parts, Tools, and Equipment

The following tables describe the parts, tools, and equipment necessary to successfully complete this instruction. Where applicable, reference to drawings provided with this instruction is provided.

**Table 2-1: Parts and Tools Included in the Service Kit**

Item #	Part No.	Qty	Description	Drawing No.	Dwg Item #
2-1-1	S100-828-3003	1	Pipette, Fuel, Outboard Filler Port	N/A	N/A

**Table 2-2: Consumables Included in the Service Kit**

Item #	Part No.	Qty	Description	Drawing No.	Dwg Item #
2-2-1	AM901.0_R-10a-RR	1	KODIAK 100 Pilot's Operating Handbook, Revision 10a, remove & replace pages	N/A	N/A

**Table 2-3: Serial-Number-Specific Parts Included in the Service Kit**

Item #	Part No.	Qty	Description	Drawing No.	Dwg Item #
2-3-1	N/A	-	N/A	N/A	N/A

**Table 2-4: Parts and Tools NOT Included in the Service Kit**

Item #	Part No.	Qty	Description	Drawing No.	Dwg Item #
2-4-1	Commercially Available	1	Thermometer	N/A	N/A
2-4-2	006-B1583-00	1	Garmin System Update Card <sup>1</sup>	N/A	N/A
2-4-3	N/A	1	Windows-based Personal Computer equipped with internal or external SD card reader <sup>2</sup>	N/A	N/A
2-4-4	N/A	1	Internet Access <sup>2</sup>	N/A	N/A

1: May be purchased through Quest Customer Care upon request.

2: Applicable for Garmin Dealers only; All others should purchase Garmin System Update Card, Item 2-4-2.



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### 3. General

The instructions contained within this Field Service Instruction detail the procedures for calibrating the fuel indication system on the KODIAK 100 aircraft. Both the Full and Empty Calibration procedures must be performed.

#### ▲ NOTE ▲

These Field Service Instructions MUST be performed in the order they are written. The Calibration Reset File must be installed prior to performing the full and empty calibrations. Moreover, the Full Calibration must be performed before the Empty Calibration.

### 4. Preparation

#### 4.1 Fuel Calibration Reset File

This section covers the procedure for downloading and securing the fuel calibration reset configuration file for use on the GARMIN® G1000™ avionics system. Since personal computers have wide variations of configurations and software installed, this procedure is written generically. It is expected that the technician performing this work instruction fully comprehends the procedures associated with downloading and saving files on a Windows® based computer (Windows 2000™, Windows XP™, Windows Vista™, or Windows 7™).

#### ▲ NOTE ▲

The fuel calibration reset configuration file must be loaded to an SD card before uploading to the GARMIN G1000 system. Authorized GARMIN dealers may proceed to **Section 4.1.1**. Alternately a pre-loaded SD card may be purchased by contacting Quest Aircraft Customer Care. If a pre-loaded card is purchased, proceed to **Section 5.1**.

#### 4.1.1 Download Procedure

#### ▲ NOTE ▲

During the download procedure, if the message “This page contains both secure and non-secure items. Do you want to display non-secure items?” is displayed, click “Yes”.

1. If your personal computer does not include an internal SD card reader, connect an external SD card reader to a USB port; a SanDisk® SD Card Reader (P/N SDDR-93™ or SDDR-99™) or equivalent is recommended.
2. Insert a blank 64MB to 2GB SD card into the SD card reader.

#### ▲ NOTE ▲

Uploading new data onto the SD card will overwrite the information currently stored on the card.

3. Navigate to [www.garmin.com](http://www.garmin.com) on the installed web browser.
4. Click on the “Dealer Resource Center” link, located in the lower frame of the home page.
5. Enter your account information and click “Sign In”.
6. Under Dealer Resource Home, click “Download Software”.
7. Enter “Fuel Calibration” into the Keyword(s) search box, and click “Go”.



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8. Locate the file named “Quest Kodiak – Fuel Calibration Reset”, and click on the file’s “Download” link.

### ▲ NOTE ▲

Your internet browser may prompt you to save the file to a local drive instead of running the file. If this occurs, save the file as directed and then run the program after downloading is completed.

9. Run the program. If the message “The publisher could not be verified. Are you sure you want to run this software?” is displayed, click “Run.”
10. Click “Yes” to install the software.
11. When the “G1000 Software Update” window is displayed, click “Next.”
12. Click “Find Drive”, select the SD card, and click “Next.”
13. When the message “WARNING: In order to complete this transfer, the drive you selected will be completely erased.” is displayed, click “Next.” The software transfer will now begin and be completed in a few seconds.
14. When “The update was successfully transferred to your card.” is displayed, click “Finish.”
15. Proceed to **Section 5.1**.

## 5. Instructions

During the calibration procedures outlined within this Field Service Instruction, follow all general procedures and precautions listed within the *KODIAK 100 Maintenance Manual*, Chapter 28.

### 5.1 Updating Configuration on the G1000 System

The following procedure outlines the steps needed to upload the configuration update to the GARMIN G1000 system.

### ▲ WARNING ▲

1. Remove the Terrain Database SD card and all other SD cards for all displays before beginning.
2. Do not press the “Cancel” softkey at any time during this procedure.
3. Do not turn off the aircraft power when loading/configuring the software.
4. When uploading software/configuration, the SD card must be inserted into the upper slot of the applicable display.
5. Display power must be off during the insertion of the SD card.
6. Display power can be left on during the removal of the SD card.

#### 5.1.1 Uploading Operational Software Procedure

1. Determine the G1000 system software version by navigating to the “AUX” Group, “SYSTEM STATUS” page on the MFD.
2. Write down the system software version number displayed in the upper right-hand corner. This number will begin with 0052, and will be used later in this procedure.



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3. Turn the master switch to the “OFF” position.
4. Verify that the following circuit breakers are in:
  - ENG AFM INST
  - NO. 1 AHRS
  - NO. 1 ADC
  - NO. 2 COMM
  - NO. 1 GPS/NAV
  - NO. 1 COMM
  - NO. 1 AUDIO
  - NO. 2 AUDIO
  - XPDR
  - ENG GUAGES
  - MFD
  - TAS
  - NO. 2 AHRS
  - NO. 2 ADC
  - NO. 2 GPS/NAV
  - XM WX
5. Insert the fuel calibration reset SD card (label on the left) into the UPPER slot on the PFD display. Gently push in the SD card until the spring latch engages. The SD card should remain flush with the face of the display faceplate.
6. Turn all three (3) displays on in Configuration mode by holding down the “ENT” key while applying power, turning on the Master and Avionics bus. Release the “ENT” key after “Initializing System” is displayed in the upper left corner of the MFD.
7. ON PFD #1, navigate to the “System Upload” page by turning the inner FMS knob.

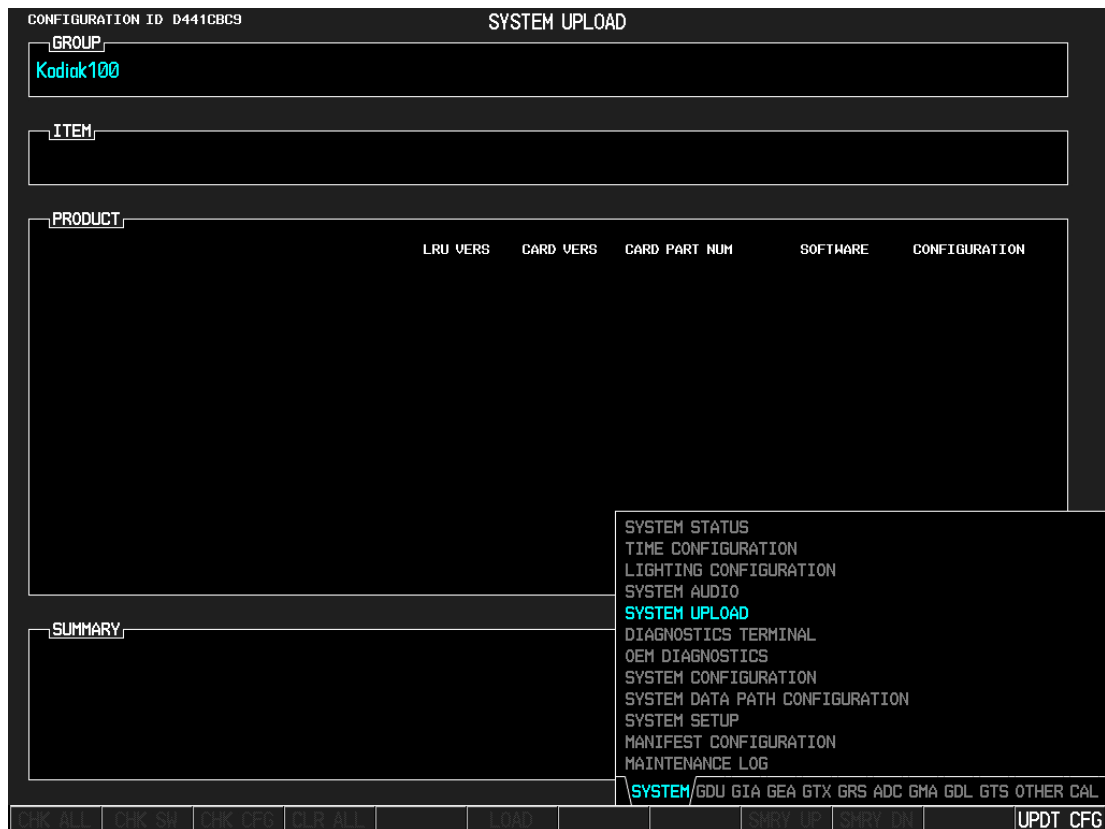


Figure 5-1: System Upload Configuration Page





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8. Press the inner FMS knob to activate the cursor and then rotate to select “KODIAK 100” in the “Group” box. Press the “ENT” key.
9. Turn the inner FMS knob to highlight the appropriate configuration file for the G1000 system software version installed on the aircraft, as determined in **Section 5.1.1, Steps 1 and 2**.
10. Press the “LOAD” softkey.
11. Allow the system to load the configuration files. This process will only take a moment.
12. Once all updates have been uploaded, press the “ENT” key.

### ▲ NOTE ▲

If a red “FAIL” appears, refer to the *GARMIN G1000 System Maintenance Manual* (P/N **190-00907-00**) revision E or later, for further instructions.

13. Once the system configuration file has been loaded, update the configuration.
  - a. Press the “UPDT CFG” softkey.
  - b. Press “ENT” key for YES.
  - c. Once complete, press “ENT” key for OK.
  - d. Turn all aircraft power off.
  - e. Remove the fuel calibration reset SD card.
14. Reinstall all SD cards removed in **Section 5.1** into their appropriate GDU slots.

## 5.2 Full Calibration

### ▲ CAUTION ▲

If the aircraft is on jacks, ensure that there is no greater than 50 gallons (345.0 lb) of fuel imbalance between the left and right fuel tanks at any point during this procedure.

1. Turn both of the overhead fuel selectors to the “OFF” position.

### ▲ NOTE ▲

When the Master Switch is on, a continuous audible tone will sound, signaling that both the overhead fuel selector valves are in the “OFF” position. The **NO. 1** and **NO. 2 Audio** circuit breakers may be pulled to deactivate the tone. Ensure both circuit breakers are re-activated after this procedure is completed.

2. Fill the fuel tanks to the bottom of the outboard filler cap with Jet A or Jet A-1 fuel.

### ▲ NOTE ▲

A full fuel tank is defined as just enough fuel to cover the anti-siphon flapper valve with a thin (1/16" – 1/8") film of fuel. The amount of fuel contained within the tank can also be verified through the use of the fuel gauge (P/N S100-828-3003).



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- Place the aircraft in a  $1.0^\circ \pm 0.25^\circ$  nose up and  $0^\circ \pm 0.1^\circ$  roll attitude, to simulate an average level cruise flight attitude.

### ▲ NOTE ▲

Any imbalance during fueling leads to differences in the amount of fuel that is required to reach the “full” mark. Verify that the fuel level remains at the “full” mark in both wings after leveling the airplane. Add or drain fuel as necessary.

- Allow the system to stabilize for a minimum of three (3) minutes.
- Turn all three displays on in Configuration mode by pushing and holding the **ENT** key on each display, while applying display power. Release the **ENT** key after “INITIALIZING SYSTEM” appears in the upper left corner of the display.
- On PFD #1, go to the “CAL” page group, “FUEL TANK CALIBRATION” page.
- On PFD #1, enter pass code: softkeys **12, 11, 10, 9** by pressing each softkey sequentially.
- With “LEFT” selected as the CURRENT TANK, press the **FULL** softkey. The cursor will automatically activate and select the “CALIBRATE?” option.
- Press **ENT**. An “ACTUAL QUANTITY” of 1056.87 lb and a “CALIBRATED VALUE” will appear in the CALIBRATION TABLE.

### ▲ NOTE ▲

If a previous CALIBRATION VALUE exists, a prompt will appear requesting overwrite acknowledgement. If prompted, select “YES” and press **ENT**.

- Record the “ACTUAL QUANTITY” and “CALIBRATED VALUE” for the left tank in the New Fuel Quantity Calibration Table (**Table 6-1**) in the row labeled “Full.”
- Observe the “CALIBRATED TOTAL” indication in the lower right hand corner. Verify that it remains at  $1056.87 \text{ lb} \pm 3.0 \text{ lb}$ .
- Press the **TNK SEL** softkey, and rotate the inner **FMS** knob to select “RIGHT”. Press **ENT**.
- Press the **FULL** softkey. The cursor will highlight the “CALIBRATE?” option.
- Press **ENT**. An “ACTUAL QUANTITY” of 1056.87 lb and a “CALIBRATED VALUE” will appear in the CALIBRATION TABLE.

### ▲ NOTE ▲

If a previous CALIBRATION VALUE exists, a prompt will appear requesting overwrite acknowledgement. If prompted, select “YES” and press **ENT**.

- Record the “ACTUAL QUANTITY” and “CALIBRATED VALUE” for the right tank in the New Fuel Quantity Calibration Table (**Table 6-1**) in the row labeled “Full.”
- Observe the “CALIBRATED TOTAL” indication in the lower right hand corner. Verify that it remains at  $1056.87 \text{ lb} \pm 3.0 \text{ lb}$ .
- Turn off the cursor by pressing the **FMS** knob, and rotate the outer **FMS** knob to select “SYSTEM” page group. Rotate the inner knob to select “SYSTEM UPLOAD” page. Press the **UPDT CFG** softkey. A prompt appears asking to “UPDATE CONFIG MODULE.” Select “YES” and press **ENT**.
- After “UPDATE CONFIG COMPLETE” appears, press the **ENT** key to select “OK”.
- Turn the master switch to the “OFF” position.



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## 5.3 Empty Calibration

### ⚠ CAUTION ⚠

If the aircraft is on jacks, ensure that there is not greater than 50 gallons (345.0 lb) of fuel imbalance between the left and right fuel tanks at any point during this procedure.

1. For the following instructions, refer to **Table 5-1** for details on the G1000 Fuel Calibration Table.
2. Ensure that the aircraft is in a  $1.0^\circ \pm 0.25^\circ$  nose up and  $0^\circ \pm 0.25^\circ$  roll attitude, to simulate an average level cruise flight attitude.
3. With both overhead fuel selector valves to the “OFF” position, drain all fuel (including unusable) from each fuel tank, in accordance with the *KODIAK 100 Maintenance Manual*, Chapter 28.
4. Check the temperature of the fuel being used for the calibration procedure.
5. Fill each wing tank with the amount of Jet A or Jet A-1 fuel called for in **Table 5-1** below.

**Table 5-1: Empty Calibration Fuel Quantity Table**

Fuel Temp (°F)	Fuel Temp (°C)	Empty Calibration (Gallons)
32-45*	0-7	10.0 + 0.2/-0.0
46-59	8-15	9.0 + 0.2/-0.0
61-74	16-23	8.0 + 0.2/-0.0
75-90	24-32	7.0 + 0.2/-0.0

\* For best fuel system accuracy, it is recommended that fuel calibrations be performed between 8° C and 32° C. Calibrations performed outside of this temperature range may result in larger fuel quantity display inaccuracies.

6. Turn all three (3) displays on in Configuration mode by pushing and holding the **ENT** key on each display, while applying display power. Release the **ENT** key after “INITIALIZING SYSTEM” appears in the upper left corner of the display.
7. On PFD #1, go to the “CAL” page group, “FUEL TANK CALIBRATION” page.
8. On PFD #1, enter pass code: softkeys **12, 11, 10, 9** by pressing each softkey sequentially.
9. Additional softkey labels will appear at the bottom of the display. The system will default to the “LEFT” tank.
10. Ensure that the aircraft is in a  $1.0^\circ \pm 0.25^\circ$  nose up and  $0^\circ \pm 0.1^\circ$  roll attitude, to simulate an average level cruise flight attitude.
11. Allow the system to stabilize for a minimum of 3 minutes.
12. Drain  $1.0 + 0.0 / -0.2$  gallons of fuel from the left tank.

### ⚠ CAUTION ⚠

Immediately after draining 1.0 gallon from the tank proceed and complete **Steps 13 and 14** within three (3) minutes after draining the 1.0 gallon of fuel.

13. Press the **EMPTY** softkey. The cursor will highlight the “CALIBRATE?” option.



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14. Press **ENT**. An “ACTUAL QUANTITY” of 0.00 lb and a “CALIBRATED VALUE” will appear in the CALIBRATION TABLE.

### ▲ NOTE ▲

If a previous CALIBRATION VALUE exists, a prompt will appear requesting overwrite acknowledgement. If prompted, select “YES” and press **ENT**.

15. Record the “ACTUAL QUANTITY” and “CALIBRATED VALUE” for the left tank in the New Fuel Quantity Calibration Table (**Table 6-1**) in the row labeled “Empty.”
16. Observe the “CALIBRATED TOTAL” indication in the lower right-hand corner. Verify that it remains at 0.00 lb ± 1.0 lb.
17. Press the **TNK SEL** softkey, and rotate the inner **FMS** knob to select “RIGHT.” Press **ENT**.
18. Drain 1.0 + 0.0 / -0.2 gallons of fuel from the right tank.

### ▲ CAUTION ▲

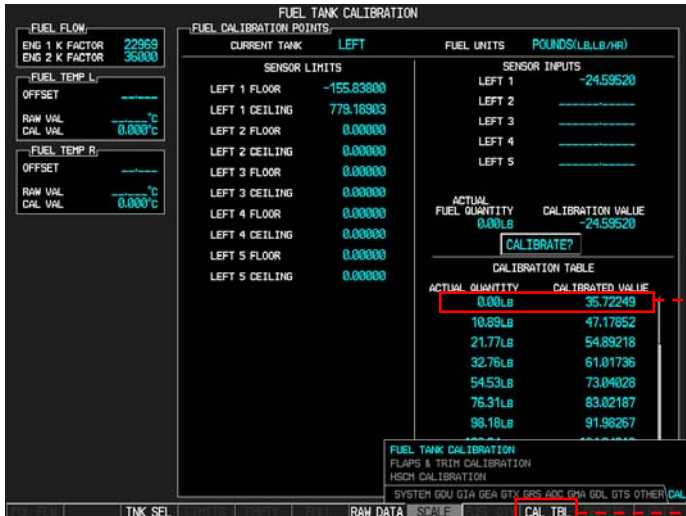
Immediately after draining 1.0 gallon from the tank proceed and complete **Steps 19** and **20** within three (3) minutes after draining the 1.0 gallon of fuel.

19. Press the **EMPTY** softkey. The cursor will highlight the “CALIBRATE?” option.
20. Press **ENT**. An “ACTUAL QUANTITY” of 0.00 lb and a “CALIBRATED VALUE” will appear in the CALIBRATION TABLE.

### ▲ NOTE ▲

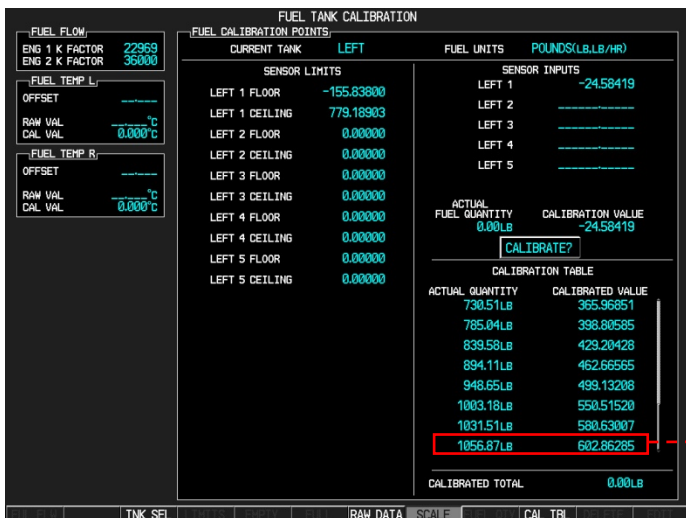
If a previous CALIBRATION VALUE exists, a prompt will appear requesting overwrite acknowledgement. If prompted, select “YES” and press **ENT**.

21. Record the “ACTUAL QUANTITY” and “CALIBRATED VALUE” for the right tank in the New Fuel Quantity Calibration Table (**Table 6-1**) in the row labeled “Empty.”
22. Observe the “CALIBRATED TOTAL” indication in the lower right-hand corner. Verify that it remains at 0.00 lb ± 1.0 lb.
23. Turn off the cursor by pressing the **FMS** knob, and rotate the outer **FMS** knob to select “SYSTEM” page group. Rotate the inner knob to select “SYSTEM UPLOAD” page. Press the **UPDT CFG** softkey. A prompt appears asking to “UPDATE CONFIG MODULE.” Select “YES” and press **ENT**.
24. After “UPDATE CONFIG COMPLETE” appears, press the **ENT** key to select “OK”.
25. Reset any circuit breakers pulled during the calibration procedure.



Empty Calibration

**Full Calibration:**  
 Click "CAL TBL" softkey, rotate inner FMS knob clockwise to view bottom of "CALIBRATION TABLE".



Full Calibration

Figure 5-2: G1000 Fuel Calibration Tables

## 5.4 Verification

1. Cycle the master switch to the "OFF" position and then back to the "ON" position, so that the Garmin G1000 system returns to Normal mode.
2. With the amount of fuel added during the Empty Calibration procedure above, **Section 5.3**, or less remaining in each tank; verify the indicated fuel quantity reads zero (0).
3. Turn the master switch to the "OFF" position.



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### 6. Completion

1. Upon completion, record all work performed in the appropriate maintenance records.
2. Fill out the attached fuel quantity calibration form, and return to Quest Aircraft Company.

Email electronic copies to:

[Customercare@questaircraft.com](mailto:Customercare@questaircraft.com) or

Mail paper copies to:

Quest Aircraft Company  
1200 Turbine Dr.  
Sandpoint ID, 83864  
Att. Customer Care



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Date: \_\_\_\_\_

Aircraft Serial Number: \_\_\_\_\_

Aircraft Total Time: \_\_\_\_\_

**Table 6-1: New Fuel Quantity Calibration Table**

	Actual Quantity		Calibrated Value	
	Left Tank	Right Tank	Left Tank	Right Tank
Empty				
Full				

Notes:  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
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