



**Morehouse**  
THE FORCE IN CALIBRATION SINCE 1925

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# OPERATION AND INSTRUCTION MANUAL

## MOREHOUSE GB2 HIGH STABILITY GAUGE BUSTER





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## Forward

### Morehouse GB2 High Stability Gauge Buster

has been designed and constructed with great care in every phase of assembly. In order to insure reliability, both the mechanical and electrical components have been built with the best available materials. Nevertheless, it has been proven that a thorough understanding of its operation, together with proper handling will return large dividends. The sections of this manual provide description and instruction on the operation and maintenance of the mechanical, electrical and software components.

You as a customer are our most valued asset. We take pride in our systems and are proud that you have become an owner. We welcome your comments about our products and wish that you express them. It is the only way that we can continue to build the best available test systems to satisfy your needs. Thank-you for your support.

### HOW TO USE THIS MANUAL

This manual is intended to educate the customer on the capabilities, operation and maintenance of the Morehouse GB2 High Stability Gauge Buster. In addition, it is to be used as a supplement for any information supplied by the load frame manufacturer. Maintenance procedures specified by the load frame manufacturer should be followed unless specifically noted herein. Read this manual and become familiar with the operation of your test machine prior to operating the Morehouse GB2 High Stability Gauge Buster.

### TECHNICAL SUPPORT

If a problem should occur with your testing machine:

- Consult troubleshooting section on-line and in this manual
- Check that all external inputs are properly connected.
- Call Morehouse's technical support at +1 (717) 843-0081 (9AM to 5PM EST) or email us at [info@mhforce.com](mailto:info@mhforce.com)



## 1. Introduction

Morehouse GB2 High Stability Gauge Buster is a specialized high resolution digital indicator designed to perform force calibrations. The indicator allows for storage of many unique calibration profiles to be validated on any conventional load cell, with accuracy exceeding the criteria outlined in ASTM E4 from 1% of full scale to full scale. It features a simplistic interface allowing the user to log, store, and transfer up to 19 distinct sets (calibration tables) of ten calibration points, to be fit ed in a piecewise linear fashion. Its accuracy, ease-of-use, and ruggedness result in a system of unrivaled price/performance.

### 1.1 Morehouse GB2 High Stability Gauge Buster Features

- Display Live Load and frozen load numerically.
- Select between force units of Lb, N, KN, kg.
- Transmit via the USB communications port results and calibration data to a remote computer running GaugeSafe™ Data Exchange Program.
- Store up to 19 load cell calibrations for multiple load cell systems. The load calibration algorithm allows up to 10 calibration points per cell with piecewise linear fit be ween points.

### 1.2 Morehouse GB2 High Stability Gauge Buster Options

- GaugeSafe™ Data Exchange Software
- Battery Pack powered unit housed in heavy duty carry case for portable applications.

### 1.3 Morehouse GB2 High Stability Gauge Buster Reporting Capabilities

#### 1.3.1 GaugeSafe™ Data Exchange Program (optional)

GaugeSafe™ is a PC-based program for exchanging data with the Morehouse GB2 High Stability Gauge Buster. It is a Windows 7/8/10 compatible program that is capable of viewing, printing and storing calibration session data uploaded via the USB communications port. GaugeSafe™ is sold separately.



## 2. Key Functions

### 2.1 The <ZERO/0> and/or <TARE> Key

The ZERO key performs the following functions:

- Defines a new zero load (tare).
- Clears out the previous calibration session data from the test buffer and initializes the indicator for the next calibration session.
- Enters the number zero.

### 2.2 The <STORE> Key

Not used.

### 2.3 The <Enter> Key

The ENTER key performs the following functions:

- Accepts/assigns the value in a data entry field to that field.
- Turns ON/OFF a menu option.

### 2.4 The <ESC> Key

The ESC key performs the following functions.

- Returns to the last menu or Live Indicating Screen.
- Clears a data entry mistake by restoring the original number in a data entry field.

### 2.5 The <UP & DOWN ARROW> Keys

The ARROW keys allow the operator to scroll through menu items.

### 2.6 The <NUMBER> Key

The NUMBER keys are used to select a menu option from within a menu or input a numerical value in a data entry field.



## 3. The Menu and Keys

### 3.1 The Setup Menu

Press the <Setup> key from the Indicating Screen to enter the Setup Menu. Use the <ARROW> keys to scroll through the menu items. Use the <NUMBER> keys to select the menu item. The following functions are provided in the Setup Menu.

1. **Load Cell.** Use to select load cell. You can select between valid load cell calibrations set up in the calibration menu.
2. **Encoder.** Not Used.
3. **Engineering Units.** Used to select between force units of Lb, N, KN, and Kg. Press <1> to change force units.
4. **Mode-Force.** Fixed to force calibrations.

### 3.2 The Report Opt Menu

Not used.

### 3.3 The ID# Menu

Not used.

### 3.4 The F1 Menu

Not used.

### 3.5 The Utils Menu

Press the <Utils> key from the Indicating Screen to enter the Utils Menu. Use the <ARROW> keys to scroll through the menu. Press the <NUMBER> keys to select the menu item. The following items are found in the Utils Menu.

1. **Clear Results.** Erases all force calibration points stored to memory. Note: Each time the user presses the button on the freeze cable, the selected/frozen force value is stored to memory.
2. **Set Date and Time.**
3. **Ck Trans-DOUT and I/O.** This function displays Input/Output status as well as the transducer readings in A/D counts. Possible A/D values are between -2,200,000,000 and +2,200,000,000.
4. **Install Defaults.** Used to put all setup parameters in a known default state. Installing defaults DOES NOT effect any of the calibration information.
5. **Stream.** Fixed to ON to stream Live Force readings to the optional GaugeSafe™ Data Exchange program.
6. **Calibrate.** A password protected menu that allows the user to add new or modify existing force calibrations. See Section 5.0.

### 3.6 The Print Menu

Not used.

### 3.7 The Disk (-) Menu

The Disk (-)Menu is only useful when the optional GaugeSafe™ Data Exchange Program is paired with the indicator.

1. **Results->Host.** Transmits stored frozen force values for a calibration session to a pc running the GaugeSafe™ Data Exchange Program.
2. **Cal->Host.** Transmits transducer calibration tables to a pc running the GaugeSafe™ Data Exchange Program.

## 4. Operation

### 4.1 Initial Steps to Initiate a Calibration Session

Figure 4.1.1 depicts the front panel of the Morehouse GB2 High Stability Gauge Buster. The active calibration table is shown in the upper left corner of the display (Calibration Table C2 in Figure 4.1.1). Prior to starting the calibration session, select the engineering units and calibration table assigned to the force standard to be used for the calibration session. Connect the force standard to the DB15 port on the rear panel and allow 15 minutes for it to reach thermal equilibrium. Remove any load from the force standard and press the <ZERO> or <TARE> key to zero the indicator as shown in Figure 4.1.1.



**Figure 4.1.1: Morehouse GB2 High Stability Gauge Buster Front Panel**

### 4.2 How to Record Points During a Calibration Session

Once the initial steps in Section 4.1 have been completed, the user can now begin applying load to the force standard. As the load increases and surpasses the Class A lower limit as specified in the calibration menu, an "A" will appear in the lower left hand corner of the display as shown in Figure 4.2.1. In addition, the force indicated on line 1 of the display is always live force. The force indicated on line 2 is either the live force or the force captured when the freeze cable button (Figure 4.2.2) is depressed. In Figure 4.2.1, line 2 is currently live force and matches the reading on line 1.





Figure 4.2.1 – Morehouse GB2 High Stability Gauge Buster Front Panel depicting the force above the Class A lower limit and both line 1 and 2 indicating live force.



Figure 4.2.2 – Freeze cable which connects to DB25 connector on rear of indicator.

Once the user achieves the desired force point, depress the freeze cable button to record the point to memory. Figure 4.2.2 depicts an “F” in the lower left corner of the display which indicates that the force indicated on line 2 is frozen to the value captured at the time the button was depressed. At the time the button was depressed, the force reading is also recorded in the data buffer. Line 2 will continue to display the force value captured at the button press, until the user depresses the button again to release the reading. Once the reading is released, line 2 will indicate the live load.



Figure 4.2.2 – Front panel depicts line 2 with the frozen captured force value.

## 5. Calibration

Refer to Section 7.1 for details on transducer connections.

### 5.1 How to Calibrate Analog Transducers

You can calibrate up to 19 load cells to the Morehouse GB2 High Stability Gauge Buster. There can be up to 10 points in each calibration.

**Step 1:** Turn on the system and allow it to run for 10 minutes before calibrating.

**Step 2:** Select the Engineering Units for calibration from the SETUP Menu. See Section 3.1 for more information.

**Step 3:** Select <6> Calibrate from the Utils Menu.

**Step 4:** Enter the password. Contact Morehouse technical support if you have lost the password.

**Step 5:** Enter a load cell number(calibration table) between 2 and 20.

**Step 6:** Select the engineering units to be used in the calibration.

**Step 7:** Input the full scale range or the capacity of the transducer. The range should be input in the currently active engineering units.

**Step 8:** Enter class A range; if not known, this can be changed after calibration is complete.

**Step 9:** Input the resolution or minimum increment.

**Step 10:** Press <1> Set Cal Points to enter the measure mode or <2> to edit the force values for the selected calibrations table, or <ESC> to exit.

**NOTE:** If you decide to exit the Calibration Menu at this time the values entered for Full Scale, Class A Range and Resolution will be saved.

### Required Information Before Continuing Calibration in Measure Mode

The program will enter the measurement mode if <1> is pressed in Step 10. During this mode, the technician can take up to ten calibration point readings (a minimum of 2 points is required).

**NOTE:** The first calibration point must be at zero load/force.

It may be beneficial to take a few more calibration readings in areas of greatest inaccuracy. The number next to "Set PT No" on the display will indicate how many calibration readings have been taken. As the calibration points are entered, write down the corresponding load value. After all ten calibration points have been taken, or the <STORE> key is pressed when using less than ten points, the Morehouse GB2 High Stability Gauge Buster automatically switches to engineering input mode. Input the load value corresponding to each calibration point reading stored. The calibration points are stored sequentially. The first point is zero followed by the second, third and so forth. Once an engineering unit values have been entered for each calibration point stored, the unit will automatically save the calibration.

**NOTE:** Display will prompt for Set PT No 0 when setting the first point. The first point in the calibration **MUST** be zero load. After all of calibration points have been stored, the first Engineering unit value entered will be 0. The prompt for this will be PT(1).

**Step 11:** Unload the transducer so there is no force applied. Press <ENTER> to take the zero reading. The left side of the display will indicate PT1 has been read.

**Step 12:** Load the transducer to the desired force and press <ENTER> to set a calibration point (voltage measurement). The voltage value is NOT displayed but it has been saved to nonvolatile memory. Write down the corresponding engineering unit value for each calibration point. Repeat this step until all readings are taken.

**Step 13:** Press <STORE> to exit the measurement mode if fewer than ten calibration points are used. The program will automatically proceed from Step 12 to Step 14 after the tenth reading.

**Step 14:** Input the corresponding engineering unit value for each measurement point. After all values have been entered, the program will automatically generate the corresponding scale factors and store them to permanent memory.

## **DONE! READY TO VERIFY CALIBRATION**

**Step 15:** To verify the calibration, exit out to the Indicating Screen and apply specific loads to the transducer and compare the reading on the indicator with the standard.

**Step 16:** If you choose to adjust one or some of the calibration points, use the Edit Calibration function from the Utils menu. This function will allow you to edit load values for one, some or all calibration points without forcing you to repeat Steps 2-14.

## **5.2 What Occurs During Calibration**

The calibration procedure allows up to ten calibration points to be entered. Each successive pair of points is connected by a straight line and the slope of each line is the calibration scale factor used for that region. This results in a piecewise linear function which maximizes accuracy.

### 5.3 Saving Calibration Data

All calibration data can be transferred between the Morehouse GB2 High Stability Gauge Buster and a pc by using the optional GaugeSafe™ Data Exchange program.

## 6. Troubleshooting

Morehouse GB2 High Stability Gauge Buster Troubleshooting		
Problem Description	Possible Causes	Action
Load Reading Wrong	Calibration	Ensure that correct load calibration is selected. The Active Calibration # is displayed in the upper left of the live screen. The Morehouse GB2 High Stability Gauge Buster can store up to six load cell calibrations.
	Analog/Digital Electronics	Contact Morehouse technical support.
	Excitation Voltage bad	Contact Morehouse technical support.
	Load Transducer Cable	Replace/fix t ansducer cable  NOTE: refer to See Electrical/Mechanical Data section of this manual for cable wiring information.
	Load Transducer	Replace load transducer
Load Reading Unstable	Calibration	Ensure that there is a valid calibration in the selected load channel. A valid calibration has at least two points, the first point MUST be zero, appropriate full scale and resolution settings and a good A/D count span between the points in the calibration.
	Analog/Digital Electronics	Contact Morehouse technical support.
	Excitation Voltage bad	Contact Morehouse technical support.
	Load Transducer Cable	Ensure that cable gain strap is properly wired for transducer being used. Replace / fix t ansducer cable.  NOTE: refer to See Electrical/Mechanical Data section of this manual for cable wiring information.

## 7. Electrical/Mechanical Data

### 7.1 User Connections

The Morehouse GB2 High Stability Gauge Buster is housed in a sheet metal enclosure measuring 7.88 in W x 6.44 in H x 2.5 in Dp and features a 2 line by 20 character display with 24 key tactile keypad. All connections are found on the rear panel as shown in Figure 7.1.1.

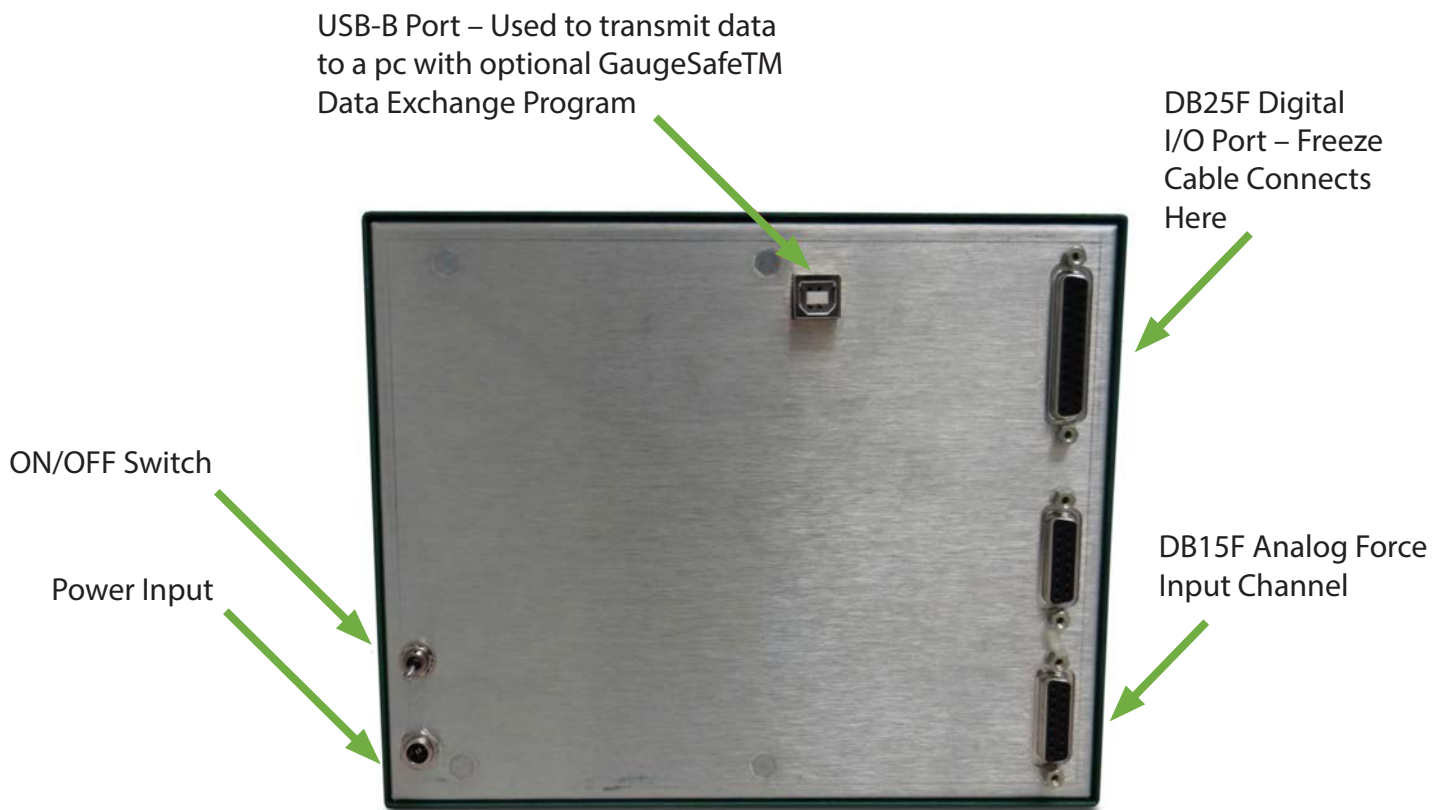


Figure 7.1.1 – Rear Panel Connections

### Analog Input Connections:

Pin 1: IN-  
Pin 2: IN+  
Pin 9: +5V Exc  
Pin 10: AGND

Input Range: 4.4 mV/V standard.  
Contact manufacturer for other input range options.  
Cable end requires a DB15 Male connector.  
Connect all shields to chassis.

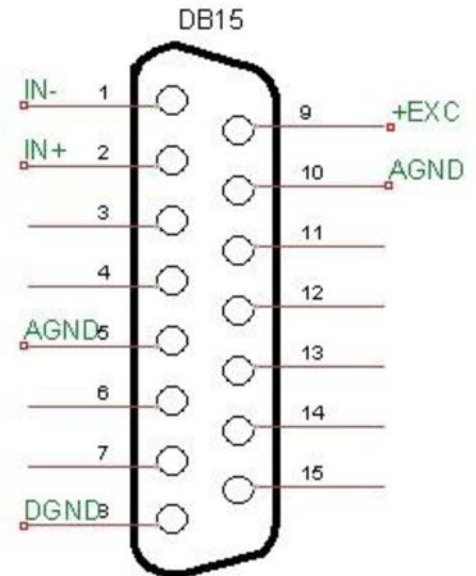


Figure 7.1.2 – DB15 Analog Input Connections.



## 7.2 Power (AC) Input

The Morehouse GB2 High Stability Gauge Buster uses a switching mode power supply. The following model is compatible with the indicator.

**Manufacturer:** Triad Magentics

**Model No:** WSU120-0700

**Input:** 100-240V 50/60Hz, 0.4A Max

**Output:** 12.0V DC 0.7 A

## 7.3 Password

**Factory Password: 268**

Use this for calibration and other password protected areas.

Morehouse suggests removing this page from the manual and placing it in a safe place.