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Instruction Manual

Model GK-502

Load Cell Readout

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TABLE of CONTENTS

| | |
|---|-----------|
| MODEL GK-502..... | 1 |
| LOAD CELL READOUT | 1 |
| 1. INTRODUCTION | 1 |
| 2. DESCRIPTION | 1 |
| 3. BASIC OPERATION..... | 2 |
| 3.1 LOAD MEASUREMENT | 2 |
| 3.2 DATA INTERPRETATION..... | 4 |
| 3.3 BATTERY CHARGING..... | 4 |
| 3.4 LOADING DEFAULT SETTINGS | 5 |
| 4. ADVANCED OPERATION | 6 |
| 4.1 ENGINEERING UNITS | 6 |
| 4.2 READING STORAGE | 13 |
| 5. CONFIGURATION MENU | 16 |
| 5.1 SOUNDS SCREEN..... | 16 |
| 5.2 GAGE FACTOR SETTING SCREEN | 17 |
| 5.3 ZERO READING SCREEN | 18 |
| 5.4 BACKLIGHT SETTING SCREEN | 18 |
| 5.5 BATTERY CHECK DISPLAY SCREEN..... | 19 |
| 5.6 CONTRAST ADJUST SETTING SCREEN..... | 20 |
| 5.7 AUTO-OFF SETTING SCREEN | 20 |
| 5.8 CLOCK SETTING SCREEN..... | 21 |
| 5.9 MEMORY VIEW SCREEN | 21 |
| 5.10 MEMORY CLEAR SCREEN | 22 |
| 6. COMMUNICATIONS..... | 23 |
| 6.1 COMMUNICATION SETTINGS..... | 23 |
| 7 COMMANDS | 24 |
| 7.1 BL (BACKLIGHT STATUS)..... | 25 |
| 7.2 BL0 (TURN BACKLIGHT OFF)..... | 26 |
| 7.3 BL1 (TURN BACKLIGHT ON) | 26 |
| 7.4 C (VIEW CURRENT CLOCK) | 26 |
| 7.5 CSMM/DD/YY/HH:MM:SS (CLOCK SET)..... | 26 |
| 7.6 D (DISPLAY STORED READINGS)..... | 26 |
| 7.7 DEFAULT (LOAD FACTORY DEFAULT SETTINGS) | 27 |
| 7.8 E (TURN-OFF GK-502) | 27 |
| 7.9 G (VIEW GAGE FACTOR) | 28 |
| 7.10 GU (VIEW GAGE FACTOR UNITS) | 28 |
| 7.11 GF#/NNN.NNN (GAGE FACTOR SET) | 28 |
| 7.12 OFF (AUTO-OFF STATUS)..... | 29 |
| 7.13 OFF0 (DISABLE AUTO-OFF)..... | 29 |
| 7.14 OFF5 (5 MINUTE AUTO-OFF)..... | 29 |
| 7.15 OFF15 (15 MINUTE AUTO-OFF)..... | 29 |
| 7.16 OFF30 (30 MINUTE AUTO-OFF)..... | 29 |
| 7.17 R (RESET MEMORY)..... | 30 |
| 7.18 RESET (RESET PROCESSOR)..... | 30 |

| | |
|---|-----------|
| 7.19 S (STORE READING) | 30 |
| 7.20 SND (SOUND STATUS) | 30 |
| 7.21 SND0 (ALL SOUNDS) | 30 |
| 7.22 SND1 (KEYCLICKS ONLY)..... | 31 |
| 7.23 SND2 (NO SOUNDS)..... | 31 |
| 7.24 SV (SOFTWARE VERSION)..... | 31 |
| 7.25 U (DISPLAY UNITS)..... | 31 |
| 7.26 U0 (MV) | 31 |
| 7.27 U1 (MV/V) | 31 |
| 7.28 U2 (DG)..... | 32 |
| 7.29 U3 (LBS) | 32 |
| 7.30 U4 (KG)..... | 32 |
| 7.31 U5 (KIPS) | 32 |
| 7.32 U6 (TONS)..... | 32 |
| 7.33 U7 (METRIC TONS) | 32 |
| 7.34 U8 (KN)..... | 33 |
| 7.35 UF (UPDATE FIRMWARE) | 33 |
| 7.36 V12 (DISPLAY 12V BATTERY VOLTAGE)..... | 33 |
| 7.37 ZR (DISPLAY ZERO READING) | 33 |
| 7.38 ZR1 (STORE ZERO READING) | 33 |
| 7.39 ZR0 (CLEAR ZERO READING)..... | 33 |
| 8 FIRMWARE UPDATE | 34 |
| 9. MAINTENANCE | 42 |
| 9.1 GENERAL MAINTENANCE..... | 42 |
| 9.2 CALIBRATION | 42 |
| 10. SPECIFICATIONS | 43 |

1. INTRODUCTION

The Geokon Model GK-502 Load Cell Readout Box is a portable battery powered instrument for reading full bridge resistance strain gage type load cells, i.e., Geokon Model 3000 series Load Cells.

2. DESCRIPTION

The GK-502 incorporates a 12 Volt, 1.4 Ahr Sealed Lead Acid (SLA) battery, 16x2 graphic liquid crystal display (LCD) with backlight, membrane keypad, and battery charger circuit. A side mounted 10-pin military style Bendix® connector provides connection to a load cell, and a second side mounted 10-pin military style Bendix® connector provides a USB connection (COM port) for communications and battery charging.

The GK-502 supplies a precision 2.048 VDC excitation to the full bridge Load Cell and displays the output in basic engineering units (Digits, mV, mV/V), updated at a 1 reading per second rate.

The GK-502 includes the ability to enter and store a Gage Factor and Zero Reading for the Load Cell, which allows for an additional set of engineering units to be displayed (lbs, Kg, Kips, Tons, Metric Tons & kN).

An internal Real-Time Clock/Calendar (RTCC) and non-volatile memory are provided which allows storage for up to 999 time-stamped readings. These stored readings may be displayed via the LCD display, or downloaded to a computer via the COM port for further analysis.

The GK-502 is designed to read both 4-wire and 6-wire full bridge load cells. Internal circuitry senses which type (4 or 6 wire) is connected and provides configuration for the appropriate load cell automatically.

Power consumption of the GK-502 is very low (300mW), and will allow continuous operation for up to 48 hours under normal conditions. Continuous battery monitoring is included that warns the user when the battery is getting low and requires recharging. To prevent damage to the internal battery due to over-discharge, the GK-502 automatically shuts itself off should the battery voltage fall below 10.7 Volts.

3. BASIC OPERATION

3.1 Load Measurement

3.1.1 Connect the load cell to the readout box by means of the 10 pin Load Cell connector.

3.1.2 Push the **ON/OFF** switch. The GK-502 will display:

| |
|--|
| G e o k o n I n c . G K - 5 0 2 v e r 2 . 9 |
|--|

3.1.3 If a Load Cell is not connected, or if there is a break in the cable between the GK-502 and the Load Cell, the GK-502 will display blinking dashes:

| |
|---|
| R e a d i n g U n i t - - - - - - - - - - - - - - - - |
|---|

3.1.4 If a Load Cell is detected, the GK-502 will begin taking readings:

| |
|--|
| R e a d i n g U n i t + 1 4 5 2 D g |
|--|

The default Unit is digits (Dg), which is proportional to the load. Pushing the **UNITS** button will display the output voltage of the Load Cell in millivolts (mV):

| |
|--|
| R e a d i n g U n i t + 0 . 7 4 1 m V |
|--|

Pushing the **UNITS** button again will display the proportional reading of the Load Cell output voltage to the Load Cell excitation voltage (mV/V):

| | |
|---------------|---------|
| R e a d i n g | U n i t |
| + 0 . 3 6 3 | m V / V |

Pushing the **UNITS** button again will return the displayed units back to digits (Dg):

| | |
|---------------|---------|
| R e a d i n g | U n i t |
| + 1 4 5 2 | D g |

3.1.5 To store the reading to memory, simply push the **STORE** button:

| | |
|-------------------|---------|
| * R e a d i n g * | U n i t |
| + 1 4 5 2 | D g X |

While the reading is being stored, an 'X' will momentarily be displayed adjacent to the engineering unit of the reading. Additionally, *Reading* will be displayed indicating that there are readings stored in memory. Stored readings, along with the reading number and the date and time that they were taken are displayed using the Configuration menu (**CFG**).

Additionally, all stored readings may be downloaded to a computer for further analysis via the COM port.

3.1.6 Power the unit off by pressing the **ON/OFF** switch. Alternately, the GK-502 will automatically power off after 5 minutes of operation.

Thirty seconds before the GK-502 automatically powers off, the LCD will begin flashing and the GK-502 will begin beeping warning that power off is approaching. Should an additional 5 minutes of operation be desired, simply push any of the membrane keypad buttons to reset the power off timer.

Note: If 5 minutes of operation is not enough, the power off timer may be changed to 15 minutes, 30 minutes or disabled via the Configuration Menu.

Refer to [5.6 Auto-Off Setting Screen](#).

3.2 Data Interpretation

Loads may be calculated from the observed display reading using the formula:

$$\text{Load} = \text{GF} \times (\mathbf{R}_1 - \mathbf{R}_0)$$

Where; Load is the applied load (lbs).

GF is the Gage Factor supplied with each load cell (see calibration certificate).

R_0 is the initial no load zero reading (Dg).

R_1 is a subsequent reading while the load is applied (Dg).

It is important to read the load cell at zero load in order to get a value of R_0 . This simple procedure is often forgotten, in which case it is necessary to resort to the calibration sheet where a no load zero reading can be obtained. It is better to measure the no load zero in the field.

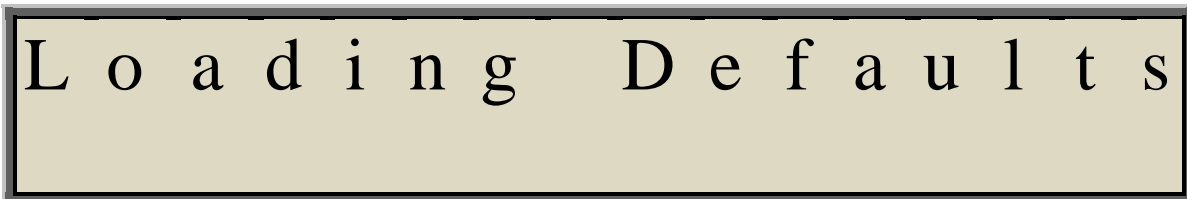
Alternatively, where the load cell data supplied includes a "regression zero" then this zero may be used. This will normally improve the accuracy at medium to high loads. However, at low loads it will usually be preferable to use the actual measured no load zero.

3.3 Battery Charging

Battery charging is accomplished by plugging the provided AC adapter into the 10-pin USB connector on the side of the readout box and into the 120 VAC mains (230 VAC adaptor also available). The charger is automatic and can be left connected to the battery indefinitely. While charging, the LCD backlight will be lit. Once the battery is fully charged, the backlight will shut off indicating that the battery is fully charged.

3.4 Loading DEFAULT Settings

To restore the GK-502 to its factory default settings, turn on the GK-502 while pressing the UNITS and CFG buttons at the same time. The GK-502 will display:

A rectangular LCD display with a black border and a light beige background. The text "Loading Defaults" is displayed in a black, monospaced font, centered horizontally and split across two lines: "L o a d i n g" on the top line and "D e f a u l t s" on the bottom line.

L o a d i n g D e f a u l t s

Then:

A rectangular LCD display with a black border and a light beige background. The text "Geokon Inc." is displayed on the top line and "GK-502 ver 2.9" is displayed on the bottom line, both in a black, monospaced font and centered horizontally.

G e o k o n I n c .
G K - 5 0 2 v e r 2 . 9

NOTE: Loading Default Settings will result in the stored Zero Reading being **erased** and the Gage Factor set to **1.00000**.

4. ADVANCED OPERATION

4.1 Engineering Units

The GK-502 is capable of displaying readings in Engineering Units other than Digits, mV or mV/V. Available Engineering Units are Lbs, Kg, Kips, Tons, metric Tons and kN. In order to provide a display of these alternate Engineering Units, a “Zero” Reading needs to be stored and the Load Cell’s Linear Gage Factor (‘K’) needs to be entered. Available gage factor units are lbs/Dg, Kips/Dg, Tons/Dg, metric Tons/Dg and kN/Dg The Linear Gage Factor is provided on the Load Cell’s Calibration Sheet.

For example, assuming a 100,000 lb. Load Cell with $K = 5.239$:

- Connect the load cell (at zero load) to the readout box by means of the 10 pin Load Cell connector.
- Push the **ON/OFF** switch. The GK-502 will display:

| |
|----------------------------|
| G e o k o n I n c . |
| G K - 5 0 2 v e r 2 . 9 |

Then:

| | |
|---------------|---------|
| R e a d i n g | U n i t |
| - 9 | D g |

Note: The -9 Dg reading will be stored as the Zero Reading of the Load Cell.

- Push and hold **STORE** to save this Zero Reading to memory. The ‘*’ symbols surrounding the word “Unit” signify that a Zero Reading has been stored:

R e a d i n g * U n i t *
 - 9 D g

- The Gage Factor is entered inside the Configuration menu. Press **CFG** to enter the Configuration menu. The GK-502 will display:

G K - 5 0 2 v e r 2 . 9
 C o n f i g M e n u

Then:

S O U N D S : P r e s s
 < S T O R E > t o A d j

- Press the **UNITS** button to access the Gage Factor Setup Screen:

G - F A C T O R : P r e s s
 < S T O R E > t o A d j

- Press **STORE** to enter the Gage Factor setup screen. The GK-502 will display:

G a g e F a c t o r :
 + 0 0 1 . 0 0 0 0 0 L b / D g

The Gage Factor is always a positive number anywhere between 0 and 999.99999. The cursor will be flashing the HUNDREDS position. Use the **UNITS** button to move the cursor to the right, the **CFG** button to increment the value at the cursor position and the **STORE** button to change the Gage Factor units.

- Press **UNITS** to move the cursor to the TENS position:

G a g e F a c t o r :
 + 0 0 1 . 0 0 0 0 0 L b / D g

- Press **UNITS** to move the cursor to the ONES position:

G a g e F a c t o r :
 + 0 0 1 . 0 0 0 0 0 L b / D g

- Press the **CFG** button four times to increment this value to 5:

G a g e F a c t o r :
 + 0 0 5 . 0 0 0 0 0 L b / D g

- Press **UNITS** to move the cursor to the TENTHS position:

G a g e F a c t o r :
 + 0 0 5 . 0 0 0 0 0 L b / D g

- Press the **CFG** button two times to increment this value to 2:

G a g e F a c t o r :
 + 0 0 5 . 2 0 0 0 0 L b / D g

- Press **UNITS** to move the cursor to the HUNDRETHS position:

G a g e F a c t o r :
 + 0 0 5 . 2 0 0 0 0 L b / D g

- Press the **CFG** button three times to increment this value to 3:

G a g e F a c t o r :
 + 0 0 5 . 2 3 0 0 0 L b / D g

- Press **UNITS** to move the cursor to the THOUSANTHS position:

G a g e F a c t o r :
 + 0 0 5 . 2 3 0 0 0 L b / D g

- Press the **CFG** button nine times to increment this value to 9:

G a g e F a c t o r :
+ 0 0 5 . 2 3 9 0 0 L b / D g

- NOTE: Briefly pressing the **STORE** button will toggle through the Gage Factor entry Units (Lb/Dg, Kp/Dg, Tn/Dg, mT/Dg, kN/Dg).
- Press and **HOLD** the **STORE** button to save the Gage Factor:

G a g e F a c t o r :
+ 0 0 5 . 2 3 9 0 0 L b / D g

- Press the **CFG** button to exit the Configuration menu and return to the Readings Screen:

R e a d i n g * U n i t *
 - 9 D g

Now there are more Engineering Units available for display. Press the **UNITS** button to scroll through the additional Engineering Units:

- Press **UNITS** to display Lbs:

R e a d i n g * U n i t *
 - 5 L b s

- Press **UNITS** to display Kg:

R e a d i n g * U n i t *
 - 2 K g

- Press **UNITS** to display Kips:

| | |
|---------------|-------------|
| R e a d i n g | * U n i t * |
| - 0 . 0 1 | K i p s |

- Press UNITS to display Tons:

| | |
|---------------|-------------|
| R e a d i n g | * U n i t * |
| - 0 . 0 0 | T n s |

- Press UNITS to display metric Tons:

| | |
|---------------|-------------|
| R e a d i n g | * U n i t * |
| - 0 . 0 0 | m T n s |

- Press UNITS to display metric kN:

| | |
|---------------|-------------|
| R e a d i n g | * U n i t * |
| - 0 . 0 0 | k N |

- Fully loading the 100,000 lb. load cell results in:

| | |
|---------------|-------------|
| R e a d i n g | * U n i t * |
| + 9 . 6 7 6 | m V |

| | |
|---------------|-------------|
| R e a d i n g | * U n i t * |
| + 4 . 7 7 0 | m V / V |

| | |
|---------------|-------------|
| R e a d i n g | * U n i t * |
| + 1 9 0 8 0 | D g |

| | |
|---------------|-------------|
| R e a d i n g | * U n i t * |
| + 1 0 0 0 0 8 | L b s |

| | |
|---------------|-------------|
| R e a d i n g | * U n i t * |
| + 4 5 3 5 4 | K g |

| | |
|---------------|-------------|
| R e a d i n g | * U n i t * |
| + 1 0 0 . 0 1 | K i p s |

| | |
|---------------|-------------|
| R e a d i n g | * U n i t * |
| + 5 0 . 0 0 | T n s |

| | |
|---------------|-------------|
| R e a d i n g | * U n i t * |
| + 4 5 . 3 5 | m T n s |

| | |
|---------------|-------------|
| R e a d i n g | * U n i t * |
| + 4 4 4 . 8 6 | k N |

4.2 Reading Storage

The GK-502 provides storage for up to 999 date and time-stamped readings. Readings are stored in non-volatile memory, and can be viewed via the Memory View screen in the Configuration menu. Stored readings may also be downloaded to a computer via the USB COM port for further analysis.

The following example will store 5 readings to memory. The Memory View screen will then be used to view these stored readings.

- Press **STORE** to store the reading at zero load. An 'X' will display on the bottom right corner of the LCD while the reading is being stored. The '*' symbols surrounding the word "Reading" signify that there are stored readings in memory:

| | |
|-------------------|-------------|
| * R e a d i n g * | * U n i t * |
| - 5 | L b s |

- Press **STORE** to store the reading at approximately 1/4 load:

| | |
|-------------------|-------------|
| * R e a d i n g * | * U n i t * |
| + 2 4 4 1 5 | L b s |

- Press **STORE** to store the reading at approximately 1/2 load:

| | |
|-------------------|-------------|
| * R e a d i n g * | * U n i t * |
| + 4 9 6 3 2 | L b s |

- Press **STORE** to store the reading at approximately 3/4 load:

| | |
|-------------------|-------------|
| * R e a d i n g * | * U n i t * |
| + 7 5 2 5 4 | L b s |

- Press **STORE** to store the reading at full load:

| | |
|-------------------|-------------|
| * R e a d i n g * | * U n i t * |
| + 1 0 0 0 1 0 | L b s |

The first 5 locations in memory now contain these readings. Since the memory is non-volatile, these readings will be retained even if the battery runs flat or is disconnected. Use the Configuration menu Memory View screen to view these stored readings:

- Press **CFG** to enter the Configuration menu. The GK-502 will display:

| | | |
|-------------|---------|-------|
| G K - 5 0 2 | v e r | 2 . 9 |
| C o n f i g | M e n u | |

Then:

| | |
|---------------|-----------|
| S O U N D S : | P r e s s |
| < S T O R E > | t o A d j |

- Press the **UNITS** button 8 times to access the Memory View Screen:

| | |
|---------------|-------------|
| M E M O R Y : | P r e s s |
| < S T O R E > | t o V i e w |

- Press **STORE** to view the 1st stored reading:

| | | | | | | |
|-----|---|-----|---|-----|-------|-----|
| 0 5 | / | 3 0 | / | 1 2 | L b s | 1 |
| 1 5 | : | 5 2 | : | 2 4 | | - 5 |

NOTE:

The date of the stored reading is at the top left of the screen.

The Units of the stored reading is at the top center of the screen.

The reading number is at the top right of the screen (1-999).

The time of the reading is at the bottom left of the screen.

The reading is at the bottom right of the screen.

- Press **STORE** to view the 2nd stored reading:

| | | | | | | |
|-----|---|-----|---|-----|-------------|---|
| 0 5 | / | 3 0 | / | 1 2 | L b s | 2 |
| 1 5 | : | 5 2 | : | 3 2 | + 2 4 4 1 5 | |

- Press **STORE** to view the 3rd stored reading:

| | | | | | | |
|-----|---|-----|---|-----|-------------|---|
| 0 5 | / | 3 0 | / | 1 2 | L b s | 3 |
| 1 5 | : | 5 4 | : | 5 6 | + 4 9 6 3 2 | |

- Press **STORE** to view the 4th stored reading:

| | | | | | | |
|-----|---|-----|---|-----|-------------|---|
| 0 5 | / | 3 0 | / | 1 2 | L b s | 4 |
| 1 5 | : | 5 5 | : | 3 1 | + 7 5 2 5 4 | |

- Press **STORE** to view the 5th stored reading:

| | | | | | | |
|-----|---|-----|---|-----|---------------|---|
| 0 5 | / | 3 0 | / | 1 2 | L b s | 5 |
| 1 5 | : | 5 6 | : | 5 1 | + 1 0 0 0 1 0 | |

NOTE: Press **CFG** to scroll backwards through the stored readings.

5. CONFIGURATION MENU

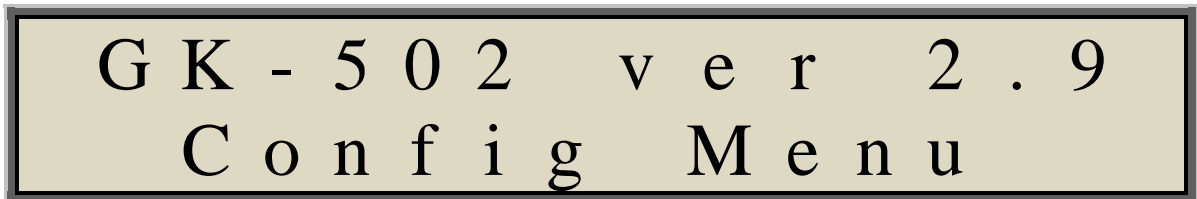
The GK-502 includes a Configuration Menu for adjustment of internal settings. The Configuration Menu is accessed from the Readings Screen by pushing the **CFG** button. Once inside the Configuration Menu, the **UNITS** button is used to scroll through the various Setting Screens, as well as scroll through the different fields in each Setting Screen. In some screens the **UNITS** button is used to decrement settings. The **CFG** button is used to increment settings as well as exit back to the Readings Screen. The **STORE** button is used to store the settings to non-volatile memory.

- Some settings are updated and stored as each setting is selected.
- Some settings require pushing STORE to update and store.
- While in the Configuration Menu, the Power-Off timer is disabled

A description of each Setting Screen is as follows:

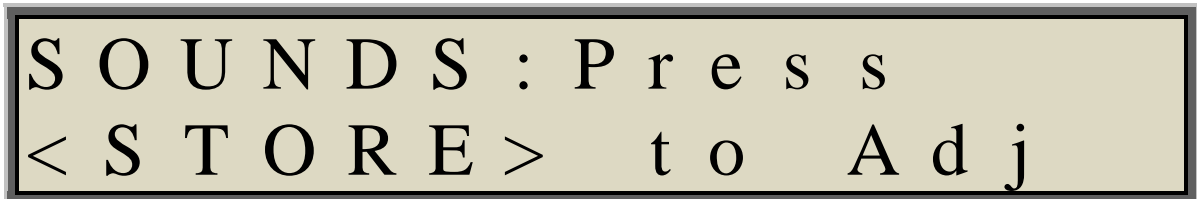
5.1 SOUNDS Screen

The SOUNDS options are entered inside the Configuration menu. Press **CFG** to enter the Configuration menu. The GK-502 will display:



G K - 5 0 2 v e r 2 . 9
C o n f i g M e n u

Then:



S O U N D S : P r e s s
< S T O R E > t o A d j

Use this screen to select the SOUNDS options. Press STORE to enable all sounds (default).

S O U N D :
A L L S O U N D S

- All SOUNDS will be enabled. This includes KeyClick sounds, Confirmation sounds and Notification sounds.
- Press **STORE** again to enable KeyClick sounds only:

S O U N D :
K E Y C L I C K S O N L Y

- Press **STORE** again to disable all sounds:

S O U N D :
N O S O U N D S

- After selecting the SOUND option desired, press **UNITS** to scroll to the Gage Factor Setting Screen:

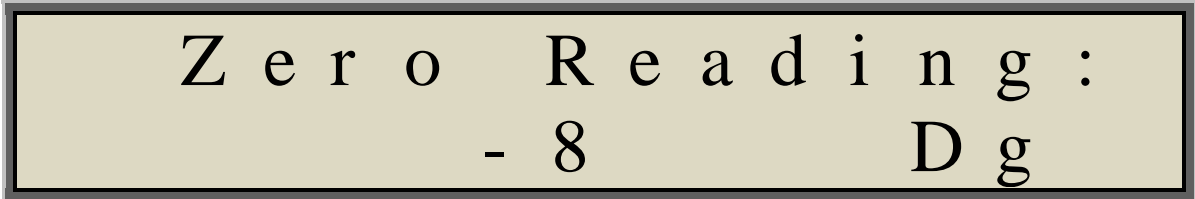
5.2 Gage Factor Setting Screen

G - F A C T O R : P r e s s
< S T O R E > t o A d j

Refer to section [4.1 Engineering Units](#) for a complete description of Gage Factor entry.

- Press **UNITS** to scroll to the Zero Reading Display Screen:

5.3 Zero Reading Screen



Use this screen to observe the stored Zero Reading.

Refer to section [4.1 Engineering Units](#) for a complete description of storing the Zero Reading.

- Press **UNITS** to scroll to the Backlight Setting Screen:

5.4 Backlight Setting Screen



Use this screen to turn the LCD backlight on (default) or off. Turning the backlight off will reduce the power consumption by 3mA, helping to extend the battery life.

- If the backlight is on, Press **STORE** to turn the backlight off:

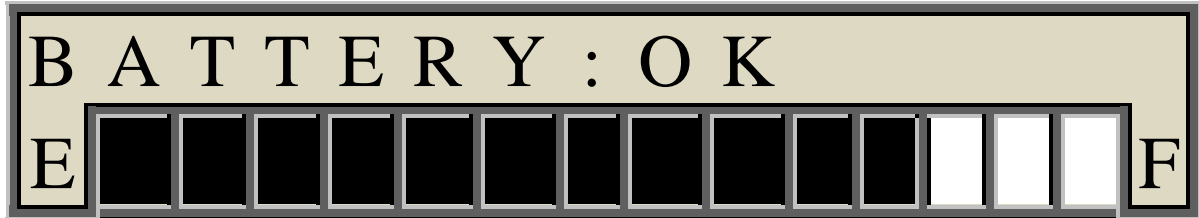


- If the backlight is off, Press **STORE** to turn the backlight on:



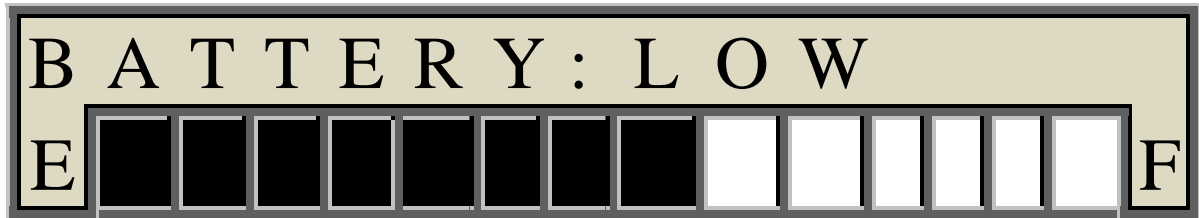
- Press **UNITS** to scroll to the Battery Check Display Screen:

5.5 Battery Check Display Screen



Use this screen to check the status of the internal 12V SLA battery voltage. Each bargraph segment represents about 100mV, with the range being from 11V (E) to $\geq 12.3V$ (F).

Once the battery voltage drops to 11.7V, the display will change to:



At this point, the battery charger should be connected to recharge the battery. The battery charger will charge the battery whether the GK-502 is on or off.

The battery voltage is continuously monitored while in the Readings Screen. If the battery voltage drops to 11.7V while taking readings, a low battery (**LOW-BAT**) warning message will flash on the screen every 30 seconds.

In both the Configuration Menu and Readings Screen, if the battery voltage continues to drop and reaches 10.7V, **CHARGE BATTERY** will appear on the screen. At this point, the GK-502 will automatically shut itself off to prevent the battery from being damaged due to over-discharge.

- Press **UNITS** to scroll to the Contrast Adjust Setting Screen:

5.6 Contrast Adjust Setting Screen

C O N T R A S T : P r e s s
< S T O R E > t o A d j

- Press **STORE** to enter the Contrast Adjust Setting Screen:

C O N T R A S T : 5 0 %



- Press **STORE** to adjust the LCD Contrast setting to the desired level.
- Press **UNITS** to scroll to the Auto-Off Setting Screen:

5.7 Auto-Off Setting Screen

A U T O - O F F : P r e s s
< S T O R E > t o A d j

- Press **STORE** to enter the Auto-Off Setting Screen:

A U T O - O F F :
5 M i n u t e s

- Press **STORE** to select 5 Minutes (default), 15 Minutes, 30 Minutes or DISABLED
- Press **UNITS** to scroll to the Clock Setting Screen:

5.8 Clock Setting Screen

C L O C K : P r e s s
< S T O R E > t o S e t

- Press **STORE** to enter the Clock Setting Screen:

D a t e : 0 5 / 3 1 / 1 2
T i m e : 1 3 : 0 3 / 2 0

The current date and time is frozen and displayed when entering the Clock Setting Screen, with the cursor blinking at the months digit.

- Press **UNITS** to scroll through the date and time settings.
- Press **CFG** to increment each setting.
- When complete, press **STORE** to load the Clock with the displayed setting and exit out to the Memory View Screen:

5.9 Memory View Screen

M E M O R Y : P r e s s
< S T O R E > t o V i e w

Use this screen to observe the stored readings.

Refer to section [4.2 Reading Storage](#) for a complete description of displaying the stored readings.

- Press **UNITS** to scroll to the Memory Clear Screen:

5.10 Memory Clear Screen

MEMORY : P r e s s
< S T O R E > t o C l e a r

When memory becomes full or otherwise needs to be cleared, Use this screen to clear the memory.

- Press **UNITS** to skip the Memory Clear Screen:
- Press **STORE** to enter the Memory Clear Screen:

The GK-502 prompts you to confirm...

P r e s s
< U N I T S > t o C l e a r

NOTE: ALL STORED READINGS WILL BE ERASED!

- Press **UNITS** to clear the memory
- Press **CFG** or **STORE** to exit without clearing the memory.

At this point the end of the Configuration Menu is reached and the menu wraps around back to the SOUNDS Screen. Continue to make other settings changes as desired or press **CFG** to return to the Readings Screen.

6. COMMUNICATIONS

The GK-502 includes a USB port to provide communications for monitoring of readings and adjustment of internal settings.

Turn on the GK-502 and connect the supplied USB Communications cable (COM-109) to the GK-502's USB port. The protective cap on the GK-502 USB connector is removed by pushing in and turning. Plug the USB-A end of the USB cable into an available USB-2.0 port on the host computer.

NOTE:

If the USB cable is connected first and then the GK-502 is turned on, the GK-502 will enter its bootloader function. The segments of the top row of the LCD screen will be dimly lit and nothing will happen for approximately ten seconds. At the end of 10 seconds, the GK-502 will turn on normally. See section [8 Firmware Update](#) for more information.

NOTE:

On certain PCs with operating systems older than XP, Service Pack 3, the GK-502 may require the installation of a driver to properly communicate with the PC. If the PC does not recognize the GK-502's internal USB to serial converter when the connection above is performed then the driver should be installed by executing the program CDM20600 on the GK-502 Install CD.

6.1 Communication Settings

The GK-502 will appear to the PC as a virtual COM port. To communicate with the GK-502, set up this COM port as follows:

| | |
|---------------|------------|
| Baud Rate: | 115200 bps |
| Data bits: | 8 |
| Parity: | none |
| Stop bits: | 1 |
| Flow control: | none |

7 COMMANDS

The commands listed here are to be used if communications between the GK-502 and the host computer are established via a terminal emulator (i.e. Windows Hyper Terminal).

As soon as communications are established, the GK-502 will begin transmitting readings in real time to the host computer:

```
2012,06,04,08,27,52,+19082,Dg,1
2012,06,04,08,27,53,+19082,Dg,1
2012,06,04,08,27,54,+19082,Dg,1
2012,06,04,08,27,55,+19082,Dg,1
```

Readings are transmitted in ASCII comma- delimited format. Readings are updated once each second, and each reading string contains nine (9) fields:

YYYY,MM,DD,hh,mm:ss, reading,units,battery check

| | |
|----------------|---------------------------------|
| YYYY: | Year |
| MM: | Month |
| DD: | Day |
| hh: | Hour (24 hour format) |
| mm: | minute |
| ss: | second |
| reading: | current displayed reading |
| units: | current displayed units |
| battery check: | 1 = battery ok, 0 = battery low |

Commands are entered while readings are being taken and displayed.

Pressing ? <ENTER> while in communications displays this list of commands:

?

| Command | Description |
|----------------------------|--------------------------------------|
| BL | BackLight status |
| BL0 | turn BackLight OFF |
| BL1 | turn BackLight ON |
| C | view current Clock |
| CSmm/dd/yy/hh:mm:ss | Clock Set |
| D | Display stored readings |
| DEFAULT | Load factory DEFAULT settings |
| E | Turn-off GK-502 |
| G | view Gage factor |
| GU | view Gage factor Units |

| | |
|--------------------|------------------------------------|
| GF#/nnn.nnn | Gage Factor set |
| OFF | Auto-OFF Status |
| OFF0 | Disable Auto-OFF |
| OFF5 | 5 Minute Auto-OFF |
| OFF15 | 15 Minute Auto-OFF |
| OFF30 | 30 Minute Auto-OFF |
| R | Reset memory |
| RESET | RESET processor |
| S | Store Reading |
| SND | Sound Status |
| SND0 | All Sounds |
| SND1 | Keyclicks Only |
| SND2 | No Sounds |
| SV | Software Version |
| U | display Units |
| U0 | mV |
| U1 | mV/V |
| U2 | Dg |
| U3 | lbs |
| U4 | Kg |
| U5 | Kips |
| U6 | Tons |
| U7 | metric Tons |
| U8 | kN |
| UF | Update Firmware |
| V12 | display 12V battery voltage |
| ZR | display Zero Reading |
| ZR1 | store Zero Reading |
| ZR0 | clear Zero Reading |

All of these commands are executed by typing the command and pressing <ENTER>. If the command was not entered correctly, the GK-502 will ignore what was entered.

The purpose and syntax of each of these commands are discussed in the following sections.

7.1 BL (BackLight status)

Display the current **BackLight** status. If the backlight is on, the GK-502 will return:

BackLight ON

If the backlight is off, the GK-502 will return:

BackLight OFF

7.2 BL0 (turn BackLight OFF)

Turn the BackLight off (0). The GK-502 will return::

BackLight OFF

7.3 BL1 (turn BackLight ON)

Turn the BackLight on (1). The GK-502 will return::

BackLight ON

7.4 C (view current Clock)

Display the current GK-502 real-time Clock settings. The **CS** command section explains how to adjust the clock settings. The GK-502 will return:

Date: 06/04/12 Time: 10:43:08

7.5 CSmm/dd/yy/hh:mm:ss (Clock Set)

Clock: Set the GK-502's internal real time clock; mm represents the month, dd the day of the month, yy the year, hh the hours, mm the minutes, and ss the seconds. Leading zeros are not needed except on the minutes and seconds entries. Illegal combinations will be ignored (i.e. CS02/30/12 or CS///12:60). Fields can be left blank to avoid changing (i.e. CS//12 to just change the year).

CS///10:45:00 The GK-502 will return:

Date: 06/04/12 Time: 10:45:00

7.6 D (Display stored readings)

Display stored readings. All readings stored in memory will be displayed. If there are no stored readings, the GK-502 will return:

Memory Empty - No Readings Stored

Otherwise, all readings stored in memory will be displayed:

2012,6,4,09,30,22,+19082,Dg,1
 2012,6,4,09,30,26,+100019,lbs,2
 2012,6,4,09,30,30,+45359,Kg,3
 2012,6,4,09,30,39,+100.02,Kips,4
 2012,6,4,09,30,42,+50.01,Tns,5
 2012,6,4,09,30,44,+45.36,mTns,6

2012,6,4,09,30,46,+444.91,kN,7
 2012,6,4,09,30,48,+9.677,mV,8
 2012,6,4,09,30,51,+4.771,mV/V,9
 2012,6,4,09,30,57,-7,Dg,10
 2012,6,4,09,31,1,+6,lbs,11
 2012,6,4,09,31,4,+3,Kg,12
 2012,6,4,09,31,7,+0.01,Kips,13
 2012,6,4,09,31,10,+0.00,Tns,14
 2012,6,4,09,31,12,+0.00,mTns,15
 2012,6,4,09,31,13,+0.00,kN,16
 2012,6,4,09,31,15,-0.004,mV,17

Note that the date and time that the reading was taken (timestamp) is displayed, along with the reading, the units of the reading, and the reading number.

7.7 DEFAULT (Load factory DEFAULT settings)

Load the factory default settings. Loading Default Settings will result in the stored Zero Reading being erased and the Gage Factor set to 1.00000. The GK-502 will ask to verify before executing. Press **Y** to continue, any other key to abort.

DEFAULT

This will load the factory default settings!

Are you sure(Y/N)?Y

Restored to factory default settings.

Factory Default Settings:

Gage Factor: 1 lb/Dg
 Zero Reading: NONE
 Backlight: ON
 Contrast: 50%
 Auto-Off: 5 minutes
 Sounds: All Sounds enabled

7.8 E (Turn-off GK-502)

Turns off the GK-502. The GK-502 will return:

OFF

Note: If the GK-502 is shut-off by using the 'E' command, the USB cable will need to be unplugged in order to turn on normally from the keypad.

7.9 G (view Gage factor)

View the stored Gage factor. The GK-502 will return:

1.00000

Note: 1.00000 is the default gage factor.

7.10 GU (view Gage factor Units)

View the stored Gage factor Units. Depending on the units of the stored Gage factor, the GK-502 will return:

Lbs/Dg
Kips/Dg
Tns/Dg
mTns/Dg
kN/Dg

7.11 GF#/nnn.nnn (Gage Factor set)

Gage Factor set. Use this command to enter the linear gage factor and gage factor units for the load cell. All gage factor values are positive from 0.00000 to 999.99999.

| # | Gage Factor Units |
|---|-------------------|
| 0 | lbs/Dg |
| 1 | Kips/Dg |
| 2 | Tons/Dg |
| 3 | Metric Tons/Dg |
| 4 | kN/Dg |

For example, to enter a gage factor of 10.4651 with a gage factor unit of kN/Dg:

GF4/10.4651

The GK-502 will return:

10.46510

Entering **GU** returns:

kN/Dg

7.12 OFF (Auto-OFF status)

Display all current auto-shutOFF status of the GK-502. The GK-502 will return:

5 Minute Auto-OFF

7.13 OFF0 (Disable Auto-OFF)

Disable the auto-OFF function. The GK-502 will only shutoff if the front panel ON/OFF button is pushed, or if the battery voltage falls below 10.7 V. The GK-502 will return:

Auto-OFF Disabled

7.14 OFF5 (5 Minute Auto-OFF)

Set the GK-502 to turn off automatically after 5 minutes of operation. The GK-502 will return:

5 Minute Auto-OFF

Note: Any front-panel keypress will reset the auto-off timer.

Note: 5 minutes is the default auto-off time period.

7.15 OFF15 (15 Minute Auto-OFF)

Set the GK-502 to turn off automatically after 15 minutes of operation. The GK-502 will return:

15 Minute Auto-OFF

Note: Any front-panel keypress will reset the auto-off timer.

7.16 OFF30 (30 Minute Auto-OFF)

Set the GK-502 to turn off automatically after 30 minutes of operation. The GK-502 will return:

30 Minute Auto-OFF

Note: Any front-panel keypress will reset the auto-off timer.

7.17 R (Reset memory)

eRase readings stored in memory. Gage Factor settings, as well as the real-time clock settings, are not affected by this command. User will be asked to verify before executing. Press **Y** to continue, any other key to abort.

R
Are you sure(Y/N)?Y
Memory cleared.

7.18 RESET (RESET processor)

RESET (re-boot) the GK-502 microprocessor. All stored readings, settings and clock settings will be retained.

RESET
Resetting...
RESET COMPLETE

Note: It takes approximately 10 seconds for **RESET** to complete. The GK-502 opening screen will appear when **RESET** is complete.

Important: It is a good idea to reload the default settings of the GK-502 immediately after a **RESET** by using the **DEFAULT** command [7.7 DEFAULT](#), or by loading default settings on Power-Up [3.4 Loading DEFAULT Settings](#). Not doing so may cause the GK-502 to stall and not take readings. Loading Default Settings will result in the stored Zero Reading being erased and the Gage Factor set to 1.00000.

7.19 S (Store Reading)

Store the current reading to memory. The GK-502 returns:

*

7.20 SND (Sound Status)

Display the current **SOUND** setup. The GK-502 returns:

All Sounds Enabled.

7.21 SND0 (All Sounds)

Enable all sounds. These include KeyClicks, Confirmation and Notification sounds. The GK-502 returns:

All Sounds Enabled.

7.22 SND1 (KeyClicks Only)

Enable KeyClicks only and disable Confirmation and Notification sounds.
The GK-502 returns:

KeyClicks Only.

7.23 SND2 (No Sounds)

Disable KeyClicks, Confirmation and Notification sounds.
The GK-502 returns:

No Sounds Enabled.

7.24 SV (Software Version)

Display the Software (firmware) Revision of the GK-502.

SV
Software version: 2.9

7.25 U (display Units)

Display the current Units of the reading. The GK-502 will return:

Dg

7.26 U0 (mV)

Change the readings' current units to mV. The GK-502 will return:

mV

7.27 U1 (mV/V)

Change the readings' current units to mV/V. The GK-502 will return:

mV/V

7.28 U2 (Dg)

Change the readings' current units to digits. The GK-502 will return:

Dg

Note: Digits (Dg) is the default units setting

7.29 U3 (lbs)

Change the readings' current units to lbs. The GK-502 will return:

lbs

7.30 U4 (Kg)

Change the readings' current units to Kg. The GK-502 will return:

Kg

7.31 U5 (Kips)

Change the readings' current units to Kips. The GK-502 will return:

Kips

7.32 U6 (Tons)

Change the readings' current units to Tons. The GK-502 will return:

Tns

7.33 U7 (metric Tons)

Change the readings' current units to metric Tons. The GK-502 will return:

mTns

7.34 U8 (kN)

Change the readings' current units to kilo Newtons. The GK-502 will return:

kN

7.35 UF (Update Firmware)

Causes the GK-502 to enter "Firmware Update" mode. See section [8 Firmware Update](#) for further information.

7.36 V12 (display 12V battery voltage)

Display the 12V battery voltage. The GK-502 will return:

12V Battery Voltage = 12.93V

7.37 ZR (display Zero Reading)

Display the stored Zero Reading. If no Zero Reading is stored, the GK-502 will return:

Zero Reading not Stored.

Otherwise the GK-502 will return the stored Zero Reading:

Zero Reading = -5.6 Dg

7.38 ZR1 (store Zero Reading)

Store the current reading as the Zero Reading. The GK-502 will return:

Zero Reading = -7.1 Dg

7.39 ZR0 (clear Zero Reading)

Clear the Zero Reading from memory. The GK-502 will return:

Zero Reading not Stored.

8 FIRMWARE UPDATE

The GK-502 provides the capability of updating its firmware while in the field. There is no need to return the GK-502 to the factory in order to have its firmware updated.

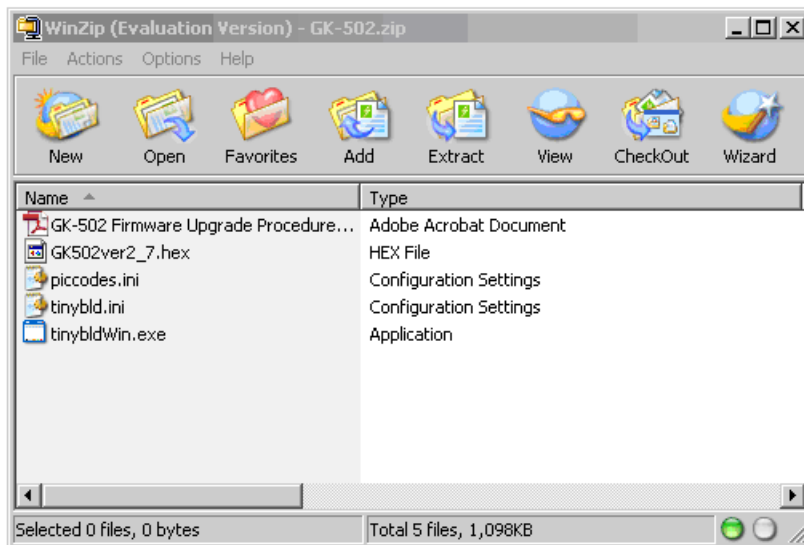
Firmware updates are required as new features are added, or bug fixes are incorporated. The current revision is available on the GK-502 product page: www.geokon.com/GK-502 or the software downloads page: www.geokon.com/software

Firmware updates may be accomplished via the GK-502's communications (COM) port. The firmware update application (tinybldWIN.exe) is a third party application written by Claudiu Chiculita of the University of Galati, Romania

The following example describes the procedure for updating a GK-502.

Make sure that your GK-502 is not connected to the host computer's USB port at this time. Use an unzip program (e.g. WinZip) to unzip and install the following files:

1. Open GK-502.zip:



The GK-502.zip file contains the following files:

tinybldWin.exe:

piccodes.ini:

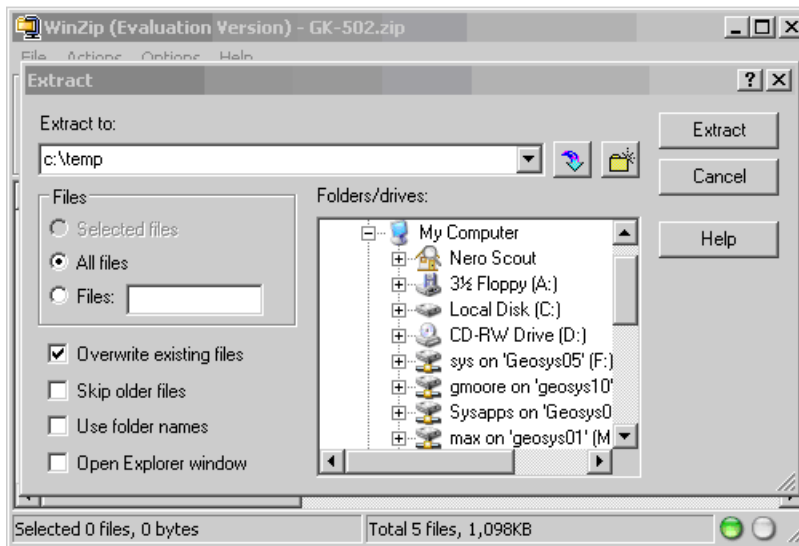
tinybld.ini:

GK502ver2_7.hex:

The application that installs the firmware
 Configuration information used by tinybldWin.exe
 Configuration information used by tinybldWin.exe
 The GK-502 firmware that will be downloaded to the GK-502. In this case, the firmware revision is 2.7.

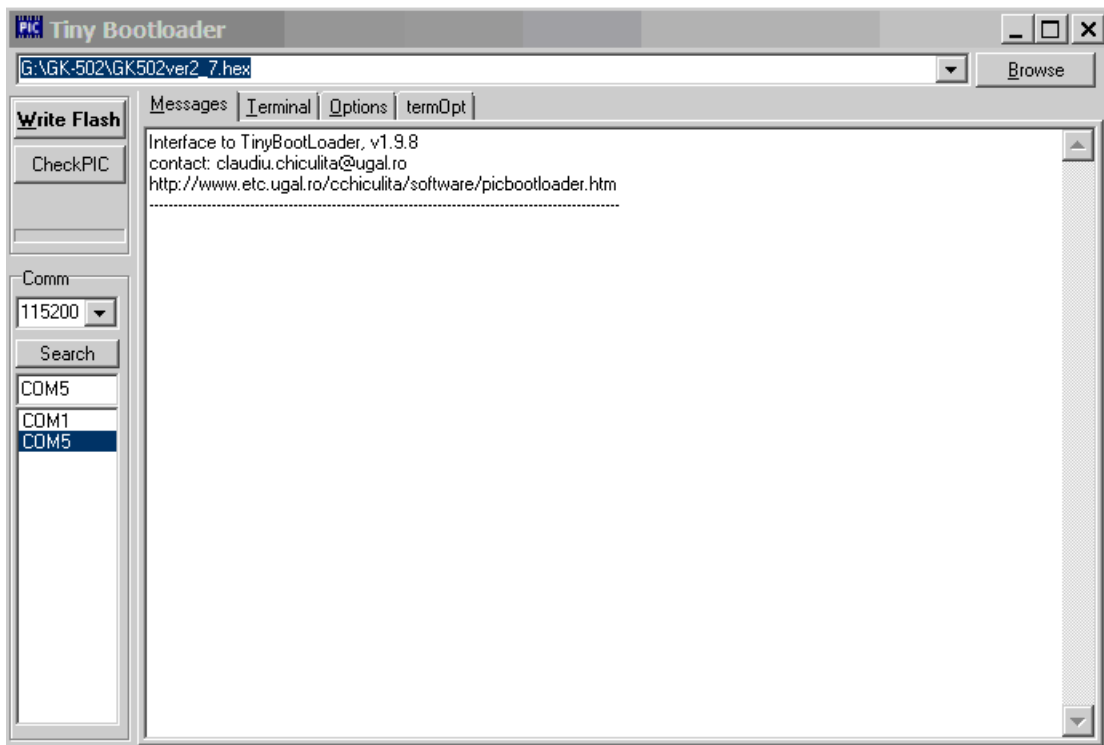
GK-502 Firmware Upgrade Procedure: PDF file of this procedure

2. Extract these five files to a folder (e.g. C:\Temp) located on the host computer:



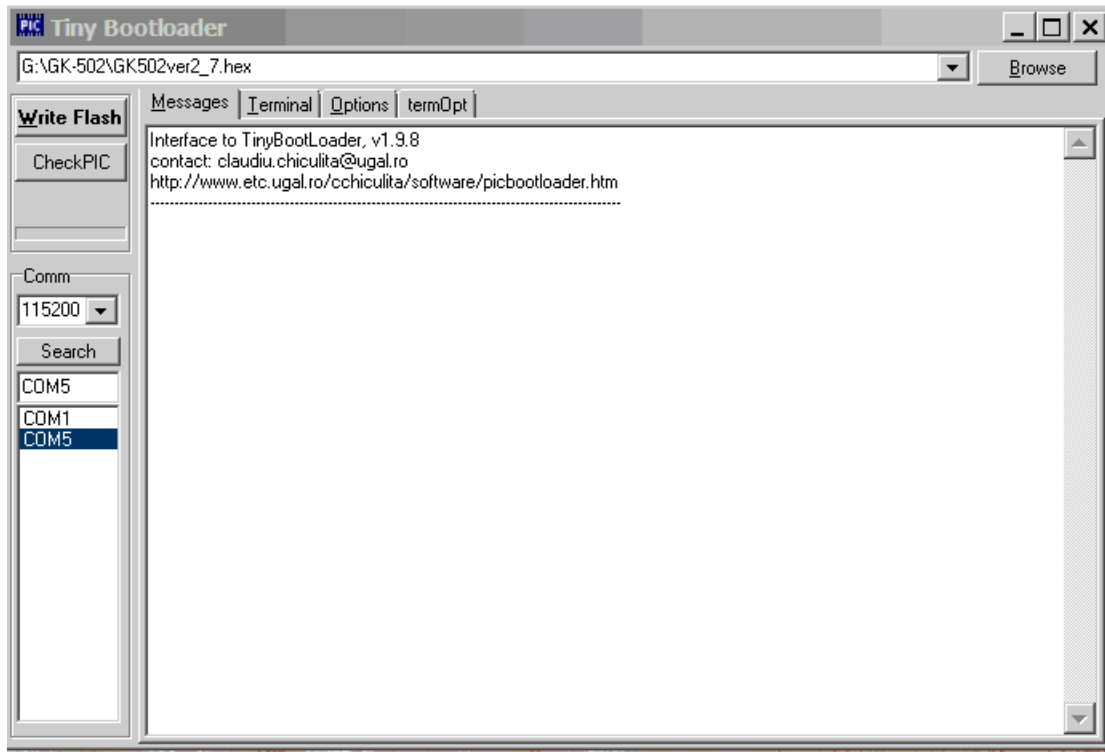
This example shows C:\temp as the target folder. All five files will be extracted to this folder.

3. Run tinybldWin.exe:



Once the five files are extracted to the target folder (C:\temp), double clicking on tinybldWin.exe starts the firmware update (bootloader) process. The program displays the **Messages** screen along with the COM port (COM5) selected and the default baud rate (115200) that will be used. Note that all available COM ports are displayed in the Comm list box. Select the applicable COM port for the GK-502.

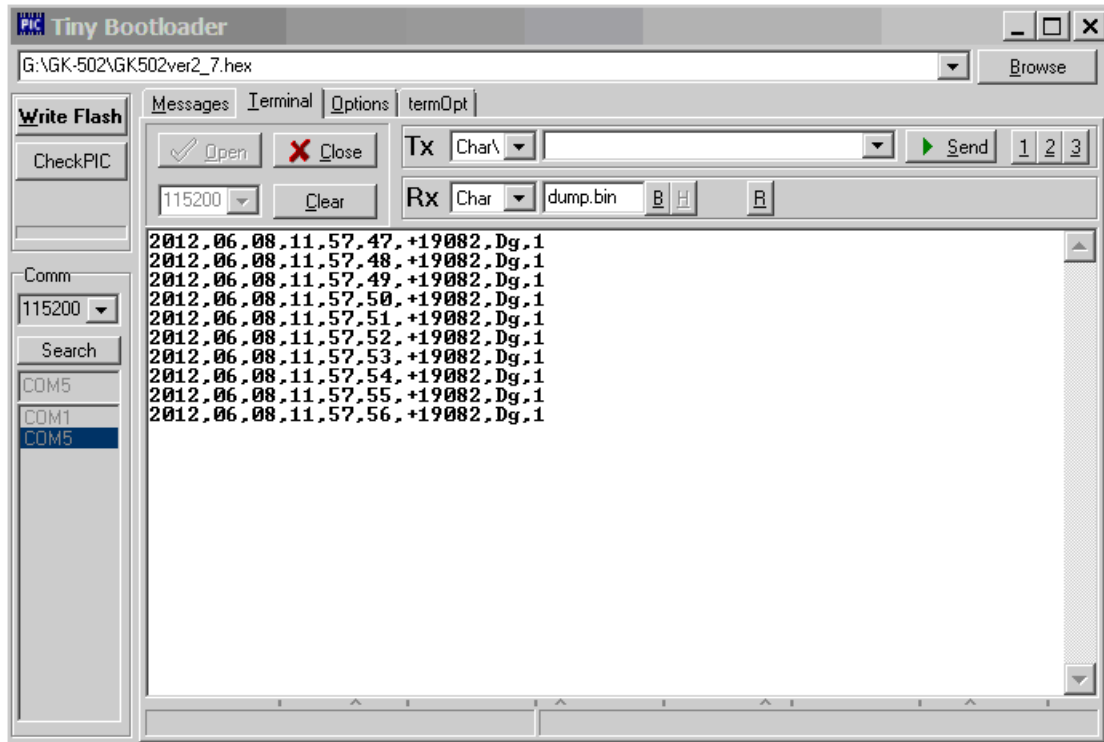
4. Select the firmware file (.hex) that the GK-502 will be updated to:



Clicking the “**Browse**” button displays the file open window. Click the .hex file that you wish to use – in this case GK502ver2_7.hex and then click “**Open**”.

5. Prepare the GK-502 for firmware update:

NOTE: If unable to establish communications with the GK-502, skip steps 5, 6 and 7 and instead go to **8a. Update Firmware (Alternate)**.



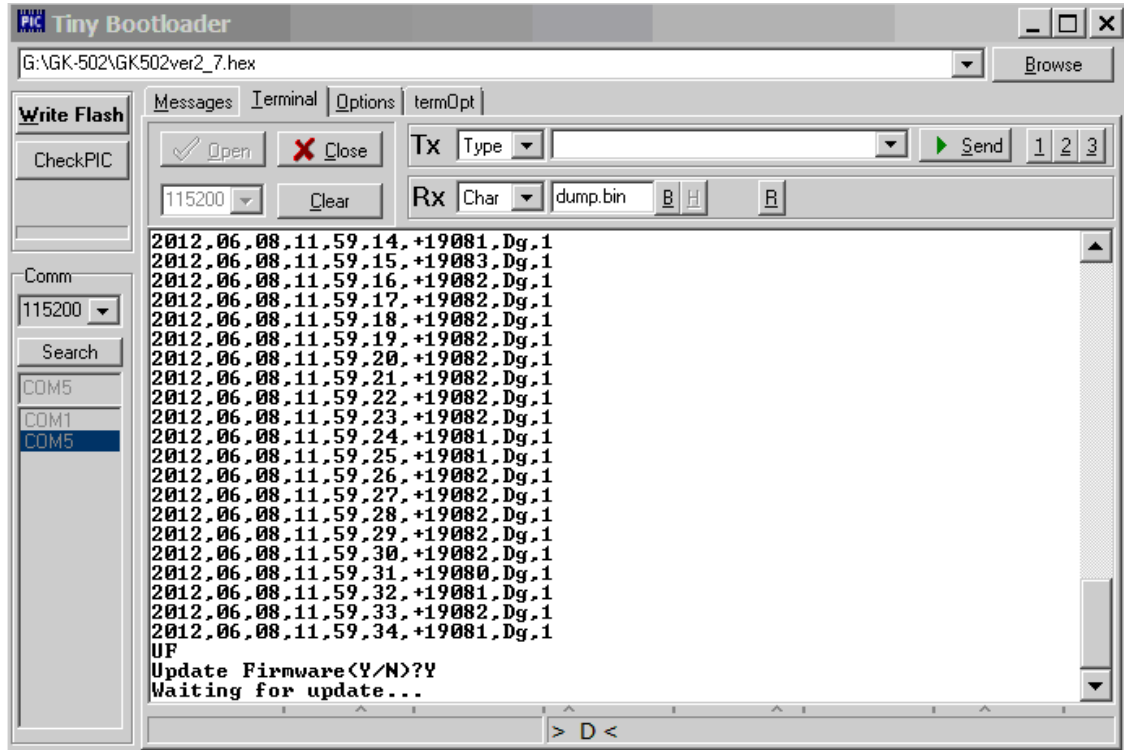
Clicking the “**T**erminal” tab displays the **T**erminal screen. This screen is used to communicate with the GK-502 and set it up for firmware update. Turn on the GK-502 and allow it to start taking readings. Connect one end of the COM port cable to the GK-502 and the other end to the computers’ USB port. Click “**O**pen” to open the selected COM port and allow communications with the GK-502. Note that the selected .hex file is displayed in the address bar at the top of the **T**erminal screen, and that the GK-502 is presently taking readings.

6. Establish communications with the GK-502:

If not already set, select 115200 in the drop-down list for the baud rate (next to the **Clear** button). Then click in the large white area of the **Terminal** screen and press **<Enter>**. The GK-502 will respond by displaying current readings in real time.

The GK-502 is now in communications and ready to receive commands.

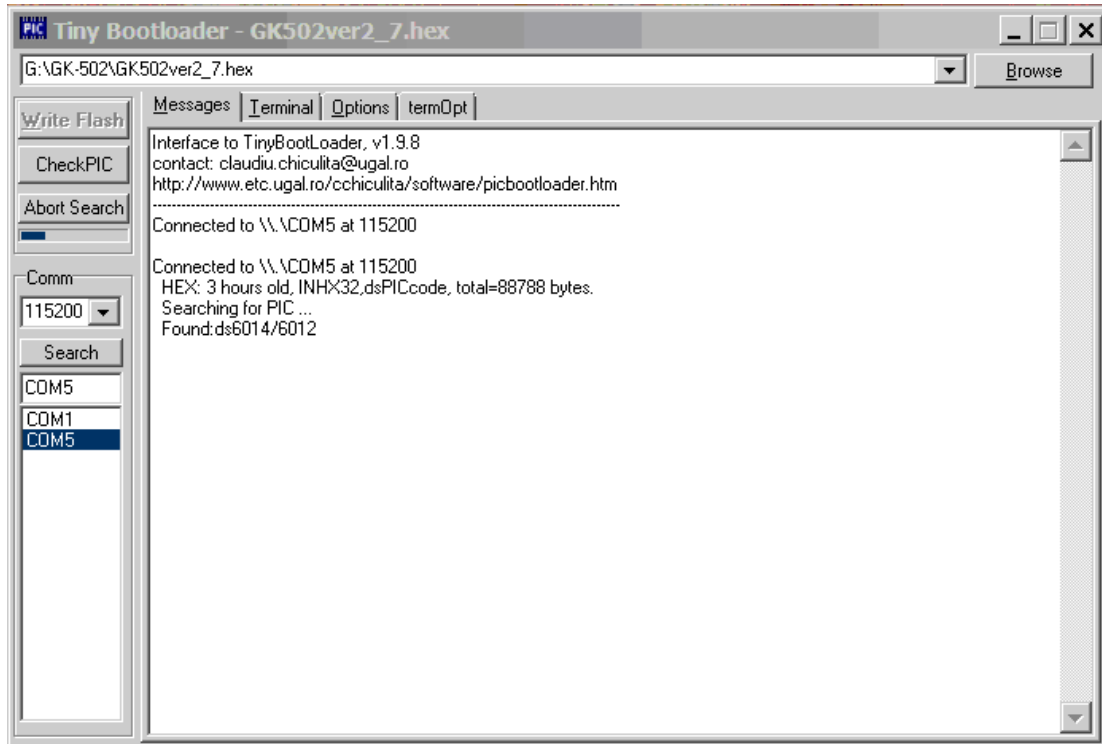
7. Enter the Update Firmware (UF) command:



Type **"UF"** and press **<Enter>** to start the firmware update process. Type **"Y"** **<Enter>**. The GK-502 now waits for the firmware (GK502ver2_7.hex) to be transmitted. Note: If no file is transmitted within 30 seconds, the GK-502 "times-out" and returns to taking readings. If this should happen, press **<Enter>** and repeat the Update Firmware command.

8. Update Firmware:

From the **Terminal** screen, after typing “UF”, “Y” and <Enter>, click “**C**lose” and then click “**W**rite Flash”:



The **M**essage screen again appears and displays “Searching for PIC...”. Once the software detects the GK-502’s microprocessor, the message “Found ds6014/6012” is displayed. At this point the progress bar located beneath the **A**bort Search button becomes active and the transmission of file GK502ver2_7.hex to the GK-502 begins.

8a. Update Firmware (Alternate):

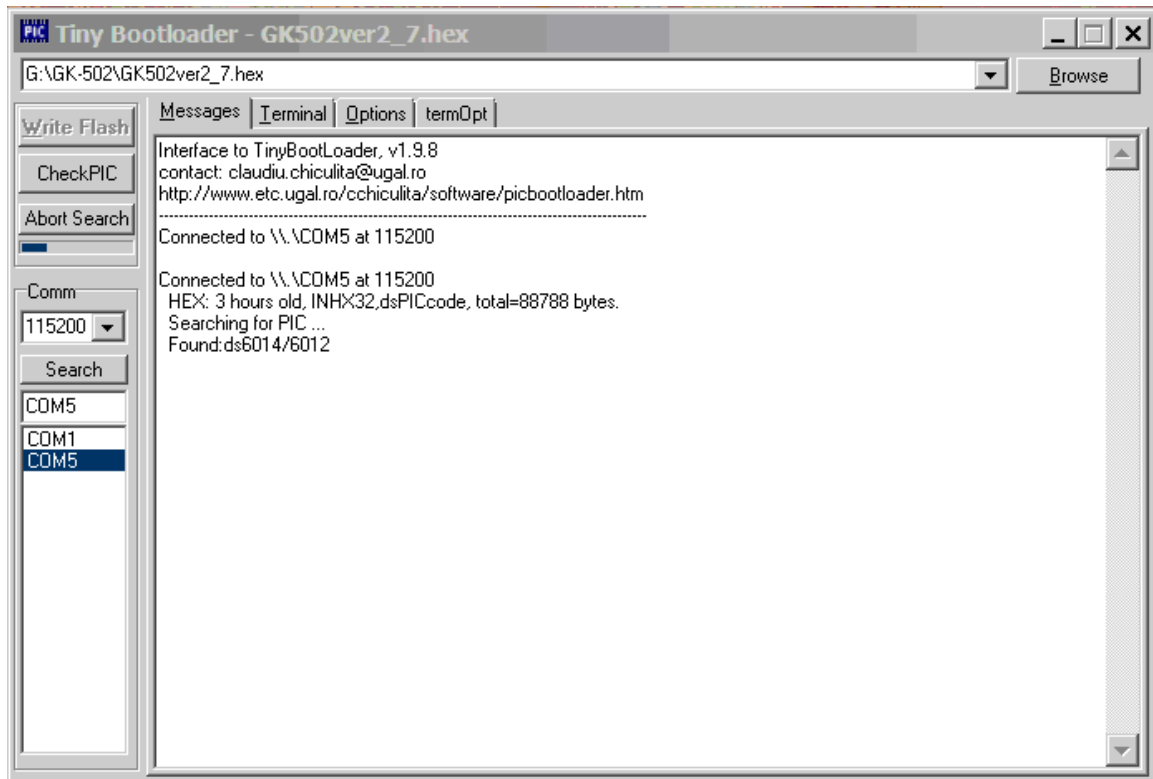
In cases where the GK-502 has lost the ability to communicate with the host computer, firmware may be updated by allowing the GK-502 to “power-up” into the bootloader.

Prepare the **M**essages screen with the correct COM port and .hex file that you want to load to the GK-502. Connect the USB cable to the GK-502 COM port and the host computers’ USB COM port.

Turn on the GK-502. Note that the top row of LCD segments are dimly lit.

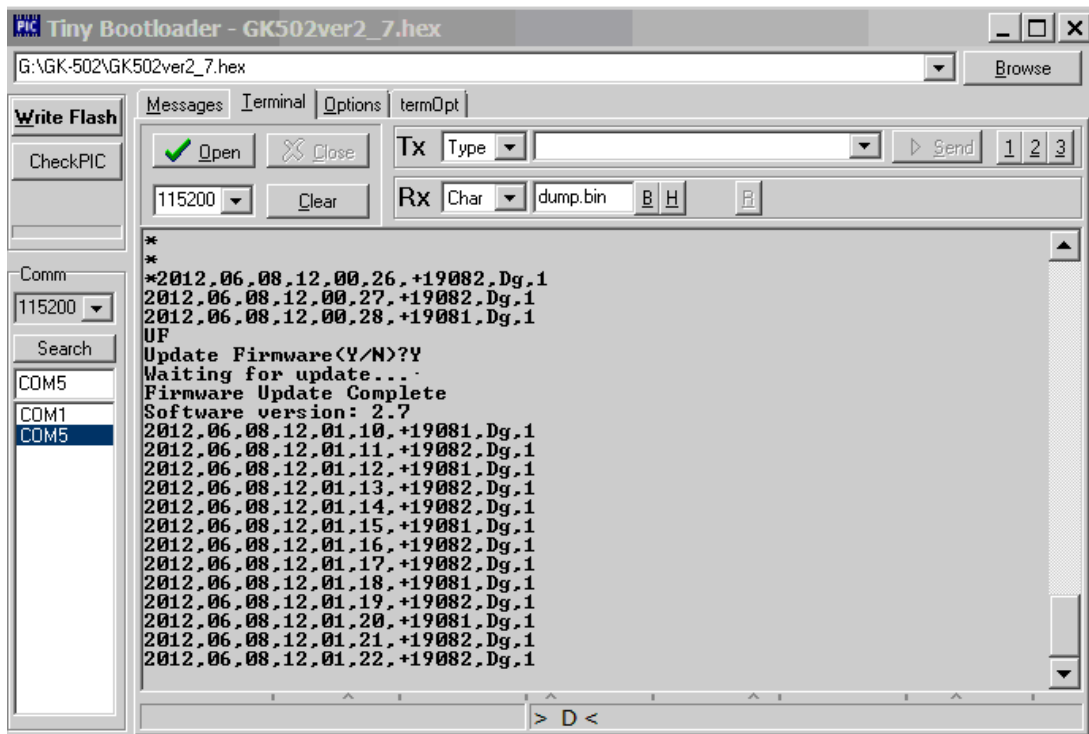


Click “**Write Flash**”:



The **Message** screen again appears and displays “Searching for PIC...”. Once the software detects the GK-502’s microprocessor, the message “Found ds6014/6012” is displayed. At this point the progress bar located beneath the **Abort Search** button becomes active and the transmission of file GK502ver2_7.hex to the GK-502 begins.

9. Firmware Update Complete:



At the conclusion of the firmware update process, the **Terminal** screen reappears and the message “**Firmware Update Complete**” is displayed, along with the version of firmware that was loaded. At this point, the firmware update process is complete.

9. MAINTENANCE

9.1 General Maintenance

Keep the following points in mind when using the GK-502 Load Cell Readout to maximize reliability and accuracy of the unit.

- It is a good practice to periodically check the Geokon website www.geokon.com for any GK-502 firmware releases, and to update the GK-502 when new firmware releases are available.
- The readout box is splash proof, but it will not withstand complete immersion in water.
- The face plate should be kept clean and dry and the box should be stored in a warm dry area when not in use.
- The LOAD CELL and COM connector connectors are waterproof.
- In very wet or humid conditions, the connectors should be kept sealed using the plug provided.
- **Do not spray oil or WD40 into the connections.** If they become wet, they must be dried prior to use or errors will likely result. Clean the connections with soap and water and dry thoroughly before use.

9.2 Calibration

The readout should be sent periodically (every 12 months) back to the manufacturer for inspection, cleaning, and calibration. A nominal fee will be charged for the service, but it is highly recommended.

10. SPECIFICATIONS

General

| | |
|--------------------------------------|---|
| Range (S+S-): | ±16mV (±31250 digits) |
| ADC: | Differential 24bit Sigma Delta |
| ADC Resolution: | 1.9 nV |
| Display Resolution: | 1uV (mV, mV/V) 1 digit (Dg) 1 lb (Lbs) 1 Kg (Kg) 0.01 Kip (Kips) 0.01 Ton (Tons) 0.01 metric Ton (metric Tons) 0.01 kN (kilo Newton) |
| Accuracy: | 0.015% (max) FSR |
| Excitation Voltage/ ADC Reference | 2.048V (± 0.001V) 3ppm/°C |
| Power Requirements: | 12 VDC @ 22 mA (operation) 12 VDC @ 16µA (off) |
| Battery Type: | Lead acid 12 volt, 1.4 Ahr |
| Operating Time: | ≈48 hours |
| AC Adaptor: | 120/230 VAC: 50-60 Hz, 18 VDC, 1.66A |
| Dimensions: | 6.5 × 4 × 8.5", 165 × 102 × 216mm |
| Weight: | 5 lbs., 2.3 kg. |
| Materials: | Aluminum case and lid |
| Operating Temperature: | -20 to +120° F, -30 to +50° C |
| Display: | 16x2 graphic LCD with backlight |
| Connectors: | Bulkhead: Bendix PTO2A-12-10S Mating: Bendix PY06A-12-10P(SR) |

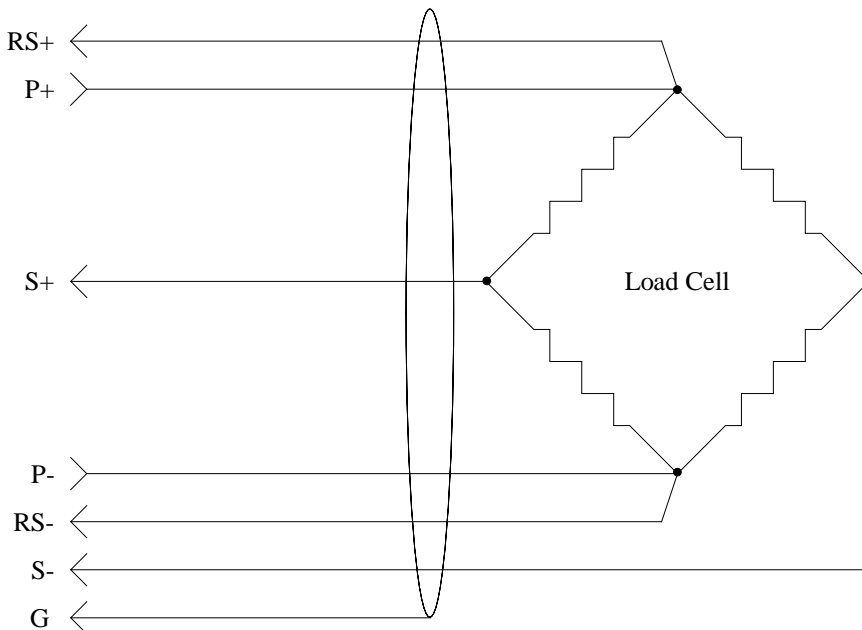
Load Cell Connector:

| Bendix Pin | Circuit Label | Description | Internal Load Cell Wiring | Geokon Purple Cable |
|------------|---------------|---------------------|---------------------------|---------------------|
| A | S- | Bridge Output - | White | White's Black |
| B | P+ | Bridge Excitation + | Red | Red |
| C | P- | Bridge Excitation - | Black ¹ | Red's Black |
| D | S+ | Bridge Output + | Green ¹ | White |
| E | NC | No Connection | | NC |
| F | G | Ground for shield | | Shield |
| G | NC | No Connection | | NC |
| H | NC | No Connection | | NC |
| J | RS+ | Remote Sense + | Red ² | Green |
| K | RS- | Remote Sense - | Black ² | Green's Black |

Notes:

¹ Green and black wires switched on Geokon load cells prior to serial number 1190.

² Non-remote sense is optional and must be specified at the time of ordering.

Circuit Diagram

USB Connector:

| Bendix Pin | Circuit Label | Description | Internal Ribbon Cable Wiring |
|------------|---------------|---------------|------------------------------|
| A | USB_VCC | USB +5V | Brown |
| B | USB_DM | USB Data - | Red |
| C | USB_DP | USB Data + | Orange |
| D | USB_GND | USB Ground | Yellow |
| E | NC | No Connection | |
| F | NC | No Connection | |
| G | CHG+ | Charger + | |
| H | CHG- | Charger - | |
| J | NC | No Connection | |
| K | NC | No Connection | |