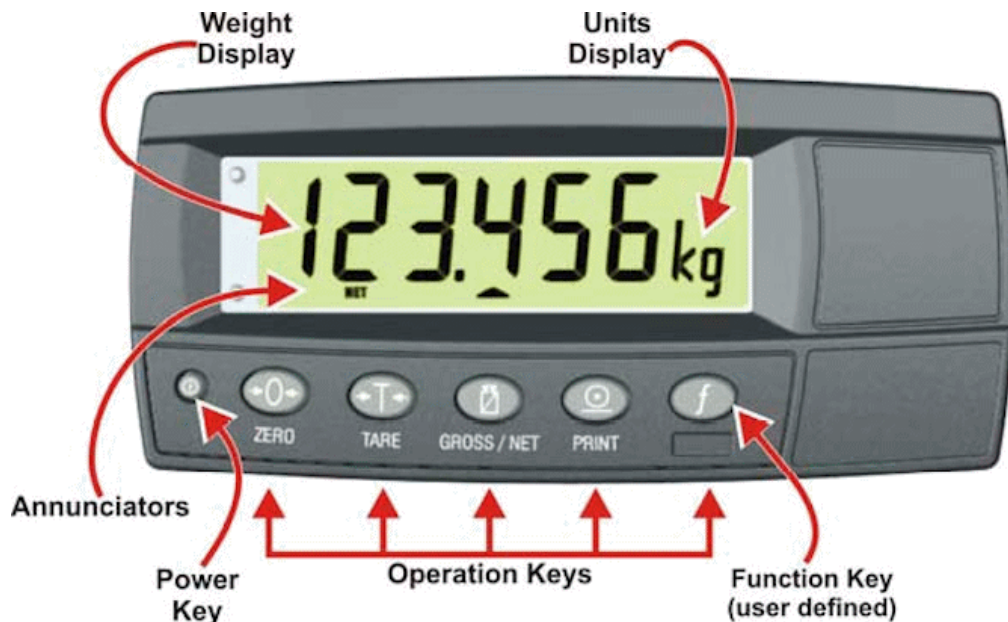


Full Calibration Procedure

LTWS-1 Hydraulic Weighting System Rinstum-R320 and GSE-250 Indicators.

Firmware A301 v1.00 to v1.53

(Last revision 10 September, 2010)



General comment:

Your **LTWS-1 Hydraulic Weighting System** can provide 98-99% or better accuracy and repeatability for most of your onboard weighing activities. To achieve these accuracies it is important to remember that virtually every hydraulic system measurement error is due to a "normal" variation in hydraulic pressure.

Try to be consistent in all hydraulic operations, consistent with safe lifting practices. Explore these tips to achieve consistent pressures for good accuracy:

- A. A good sequence for consistent operation is to Tilt the mast back, Lift and Weigh.
- B. Where possible, when you lift your fork or bucket do so at the most rapid, safe lift-rate
- C. Immediately prior to lifting the loaded forks or bucket to weigh, lower and force the loaded carriage to the ground or lowest extension. Note the negative weight indication, where the weight ceases to change when in the pressed down position. This is a good indication that the pressure has stabilized prior to lifting an unknown weight. Then raise the carriage to the weighing point to acquire the Load Weight. Begin every weighing operation from the ground. You may observe a (-) weight when the forks are pressed to the ground. This is normal and the number represents the weight of your forks and carriage. The number should be as consistent as your other displayed weights.
- D. If you are not certain of your weight, lower the carriage and begin the lift again.

CALIBRATION:

The Calibration process is performed in three stages:

The first stage establishes ZERO - the empty forks reference pressure. We are actually weighing the empty forks by measuring the hydraulic pressure necessary to raise the carriage and fork assembly. This pressure is assigned the arbitrary value of "ZERO".

The second stage records the pressure necessary to lift a known weight, called the SPAN weight.

All subsequent weights are calculated using the ZERO and SPAN as reference points upon a linear vector. Often a third stage is necessary to adjust (fine-tune) the automatic conversion of hydraulic pressure to weight.

Preliminary Tasks:

Secure a known weight test load. We recommend a weight of at least half of the maximum machine safe lifting capacity or of the maximum weight in your normal operation. Heavier is better than lighter. Check the Setup of the Indicator according to the SetUp procedure. (Skip this step if you have just completed the SetUp.)

Apply Power:

Apply power to the indicator. Press the small **Power Key**  on the left face of the Indicator to turn the Indicator **ON**. (The Indicator may turn on automatically when the voltage source is applied).

The Indicator will flash the firmware I.D. and then display a static Weight. When the Indicator has completed the power-up sequences, a weight will probably be displayed on the Indicator.

If the forks are on the ground, this number may be a negative weight (-). Do not be alarmed if this is not true. Display errors before Calibration are normally resolved during the Calibration Process.



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Activate Calibration Mode:

Simultaneously hold down the small Power Key  and the "F" Key  for about two (2) Seconds to enter **SetUp/Calibrate Mode**.

The indicator will display in automatic sequential order: FULL, SETUP, **the firmware I.D.** , and bUILD (BUILD)




The unit is now ready to calibrate ZERO.


Press "0" (ZERO)  until "OPT iON" (OPTION) is displayed




Press "T" (TARE)  (8 TIMES) until "StArt" (START) is displayed.



Press GROSS/NET key  and either "kEy" (KEY) or "AUtO" (AUTO) will be displayed

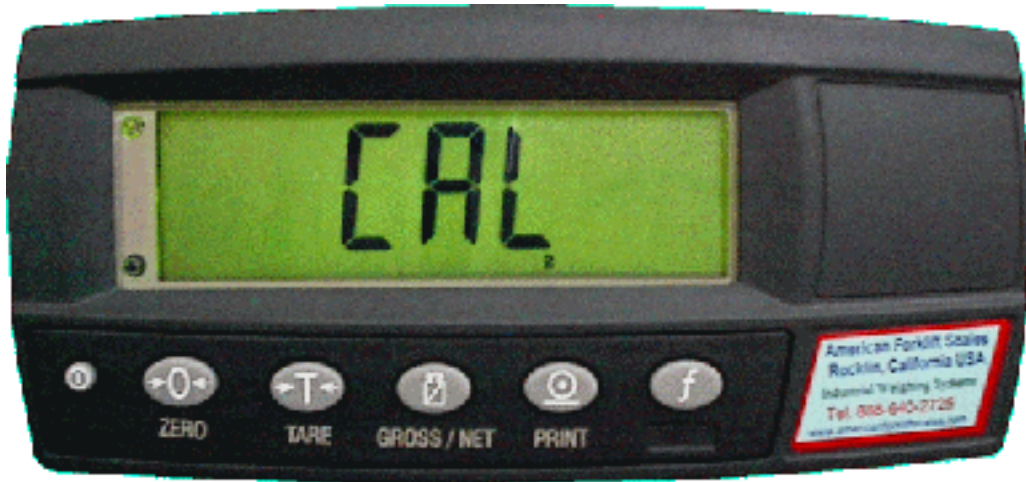
Press "PRINT" key  until "kEy" (KEY) appears on the display



Press  to store the "kEy" (kEy) setting. The Display will revert to "StArt" ("START")




Press "0" (ZERO)  until "CAL" (CAL) is displayed



Press "T" (Tare)  to select "ZEro" (ZERO)




Press GROSS/NET key  and the display will show "(some number)".

This number is "live" and related to the hydraulic pressure of the instant. (See tech notes for usefulness of this number in calibrating and trouble-shooting.)




Lift empty forks and stop at the height where you will normally weigh your loads.


Press  to store the "ZErO" (ZERO) setting. The Display will show "Z.in.P" momentarily, then Display "0 lb" or a weight close to zero pounds.

Please remember that this number is "live" and related to the hydraulic pressure of the instant. After the initial "0" is set, the number will change with bleed-off of hydraulic pressure. This is normal in a "live" measurement environment. The Indicator Firmware deals appropriately with bleed-off when the system is in "AUTO" mode instead of manual (KEY) mode.




Press "T" (Tare)  (two times) to select "SPAN" (SPAN)



Press GROSS/NET key  and the display will show "(some number)".

This number is "live" and related to the hydraulic pressure of the instant. (See tech notes for usefulness of this number in calibrating and trouble-shooting.)



Press GROSS/NET key  again to enter your Known Weight. The display will show the last calibration weight with a flashing digit.

Enter your test weight value using the GROSS/NET key to select the flashing "0" and change the value of that flashing number with the PRINT key.



Lift the test weight and stop at the height where you will normally weigh your loads.


Press  to store the "SPAN" (SPAN) setting. The Display will show "S.in.P"

momentarily, then display the weight of your test load. This is a "live" weight and will change with bleed-off. It is a good practice to lower your test weight and pick it up again to note the initial weight shown on the Display.




Please remember that these numbers are "live" and related to the hydraulic pressure of the instant. After the lift is stopped, the number will change with bleed-off of hydraulic pressure. This is normal in a "live" measurement environment. The Indicator Firmware deals appropriately with bleed-off when the system is in "AUTO" mode instead of manual (KEY) mode.



Press "0" (ZERO)  until "OPT iON" (OPTION) is displayed




Press "T" (Tare)  (eight times) to select "START"




Press GROSS/NET key  and "kEy" (KEY) will be displayed



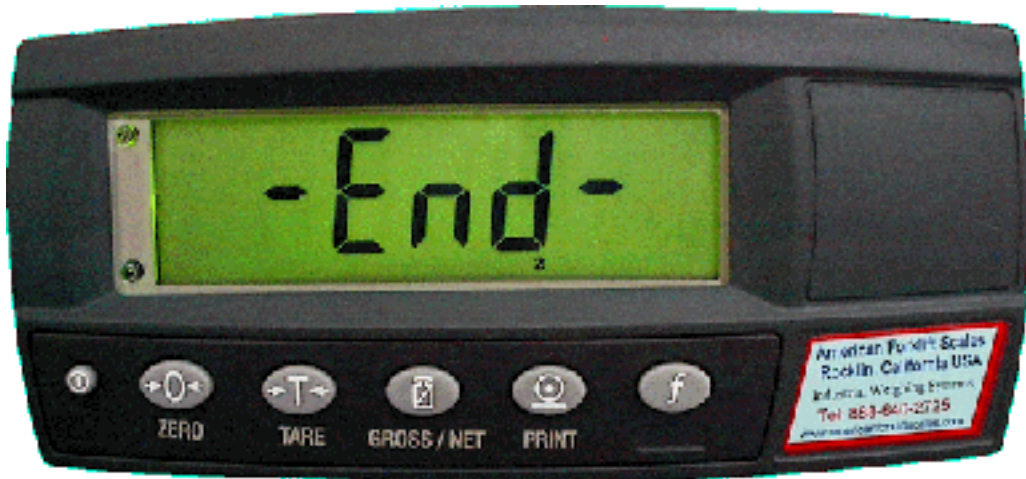
Press "PRINT" key  until "AUtO" (AUTO) appears on the display




Press  to store the "AUtO" setting. The Display will revert to "StArt"



Press "0" (ZERO) several times  until "End" (END) is displayed



Press "T" (Tare)  to Save and Exit. The display will show "SAVING" and enter normal Weighing Mode.



Primary Calibration is now complete.

It is good practice to lift your test weight several times to determine the repeatability of the machine and Scale SetUp.

If convenient, lift two or three other known weights of different ranges to assure yourself that the Weighing System weighs consistently and accurately across a range of weights.

Call Tech Support if you need assistance. **(805-236-7406)**. Tech Support at this number is available 7 days per week, including holidays.