



# American Forklift Scale LLC

Accurate and Affordable Industrial Truck Scales

## *Model LTWS-1 Patriot Model*

Forklift and Loader Economy Hydraulic Weighing System

# Operator Guide

Rinstrum Indicators R320-323 - A309-v4

This Revision 20 September, 2021

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## Economy Model

*Static Weighing  
Hydraulic Scale*



American Forklift Scales are designed to measure the load weight when the load has been picked up.

## Hydraulic Forklift Weighing Systems

by

## American Forklift Scale LLC

6100 Horseshoe Bar Road

Suite A-326

Loomis, CA 95650

Tel: 888-640-2725 FAX: 916-660-0679

sales@americanforkliftscale.com

Set-up - Calibration - Operation - Installation - Troubleshooting

**Call Tech Support 24-7**

**(Cell) 805-236-7406**

[tech@americanforkliftscale.com](mailto:tech@americanforkliftscale.com)



# AMERICAN FORKLIFT SCALE LLC

Accurate and Affordable Industrial Truck Scales

## Model LTWS-1 Patriot System

Rinstrum R320/R323 A309-v4 Scale Indicator

Economy Model Static Weighing Hydraulic Scale  
For Lift Trucks and Loaders

Last Revised 20 September, 2021

### System Technical Specifications

#### General Features

#### Technical Features

- ✓ Most **user-friendly** system available with built-in troubleshooting diagnostics and our 24-7 **Technical Support line. 805-236-7406**
- ✓ Hydraulic Transducer: Typically 5000psi 3 mV/V, 4-Wire, Temperature Compensated
- ✓ System is designed to work dependably and accurately in the harshest environments.
- ✓ Accumulation feature allows operators to either count up for total or display single load weight.
- ✓ Accurate and requires on average only 2 to 3 hours for installation.
- ✓ RS232 Printer accessory available providing weight, date, time and total weight.
- ✓ Setpoint with Isolated 300mA 50V Output
- ✓ Internal Clock/Calendar

- Input Power - Voltage:** 9 - 18Vdc
- Input Power - Current/Amps:** Maximum: 500mA Input
- Power - Current/Amps:** Nominal: 80mA  
+ 15mA per 350 Ohm transducer
- Excitation Voltage:** 5Vdc
- Maximum Transducers:** Four (4) X 350 Ohm
- Operating Temperature:** 14F to 104F (10C to 40C)
- Control Panel Key Functions:**  
Power/Units, ZERO, Tare, Select, Print, OK/Function
- Serial Port:** Full Duplex RS-232 format
- DisplayTechnology:** 6 digit LCD 3/4" height
- Standard Housing Material:** Grey ABS
- Weight:** 1 lb. 6oz.
- Shipping Weight:** 2 lb. 4oz.
- Stainless Steel Washdown Model Available.**
- Please contact us!**

#### **Options and Accessories:**

- Receipt Printer
- Voltage-Converter for 24Volt to 48Volt systems)
- The **American Forklift Scale** onboard hydraulic weighing system determines the load weight by sensing the hydraulic pressure needed to extend the lift cylinder for raising or holding the forks.
- The heavier the load, the greater the pressure in the hydraulic line. Pressure = Weight
- This signal is transmitted to the In-Cab meter, which calculates and displays the weight on the forks.
- Accuracy and Repeatability are affected by consistency of operation and condition of lift system.

### American Forklift Scale LLC

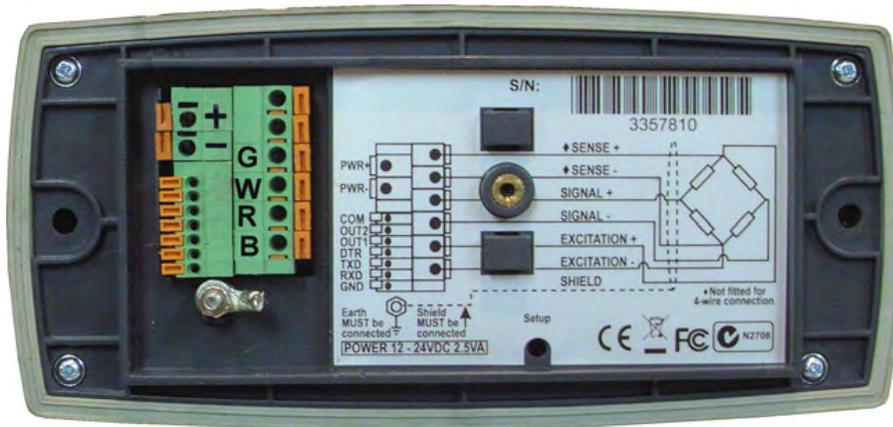
6100 Horseshoe Bar Road  
Suite A-326  
Loomis, CA 95650  
Tel: 888-640-2725 FAX: 916-660-0679  
sales@americanforkliftscale.com

**Unlimited 24-7 Telephone Tech Support 805-236-7406**

### Rinstrum R320 Scale Indicator Face View



### Rinstrum R320 Scale Indicator Rear View (R323 Connections Identical)



### Rinstrum R323 Scale Indicator Face View (Stainless Steel Washdown Housing)



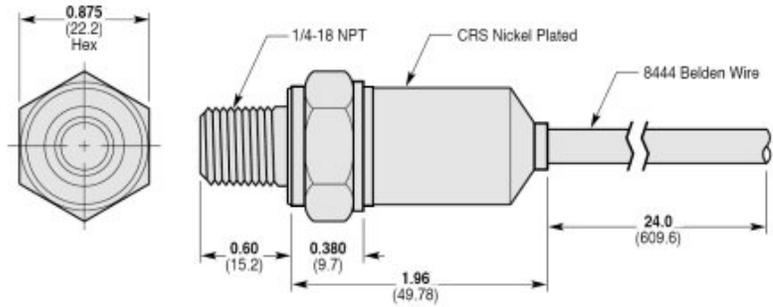
## Hydraulic Transducer Installation

This weighing system depends upon a direct connection to the active lifting and holding pressure used by the primary lifting cylinders.

The ideal sensor "Tee" location is at the high-pressure feed port to one of the primary lift cylinders. However, any unrestricted free-flow point will probably work fine.

Avoid filters, check valves, flow restrictors or valving between the cylinder and the transducer.

## Typical Pressure Transducer



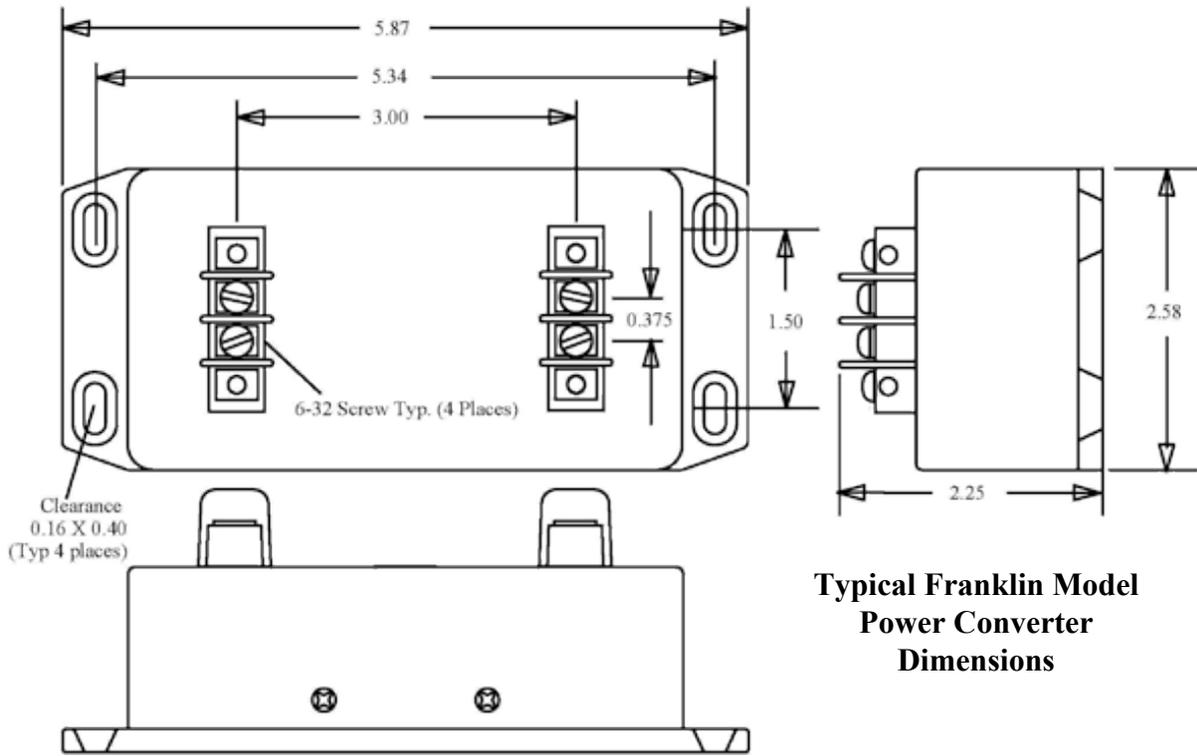
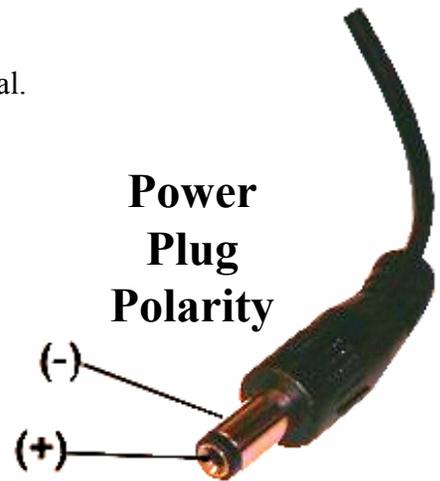
## Electrical Installation

Rinstrum R320 Scale Indicator Power: 9Vdc to 18Vdc from Truck Electrical. Power may be attached via external plug or hardwired to internal Euro connector.

Connect power via Key Switch or directly to Battery Power.

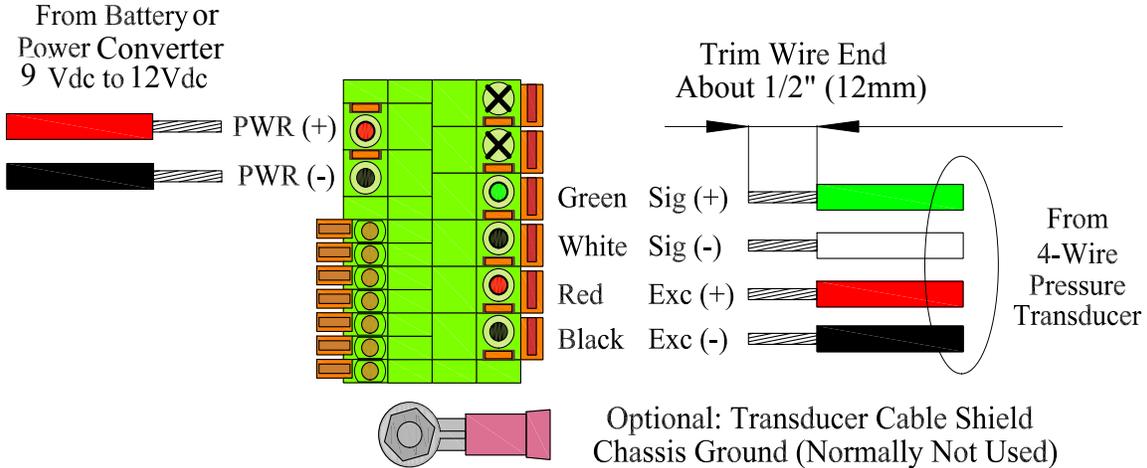
Recommended in-line fuse for truck electrical protection: 2.0A Minimum.

For 24, 36, 48Vdc truck electrical systems, contact Sales for Power Converter recommendations.

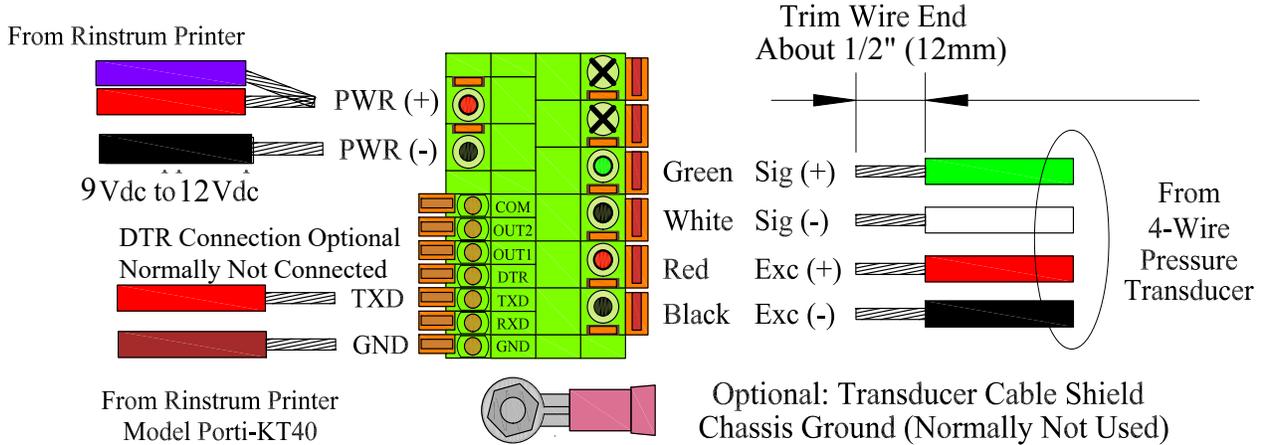


**Typical Franklin Model  
Power Converter  
Dimensions**

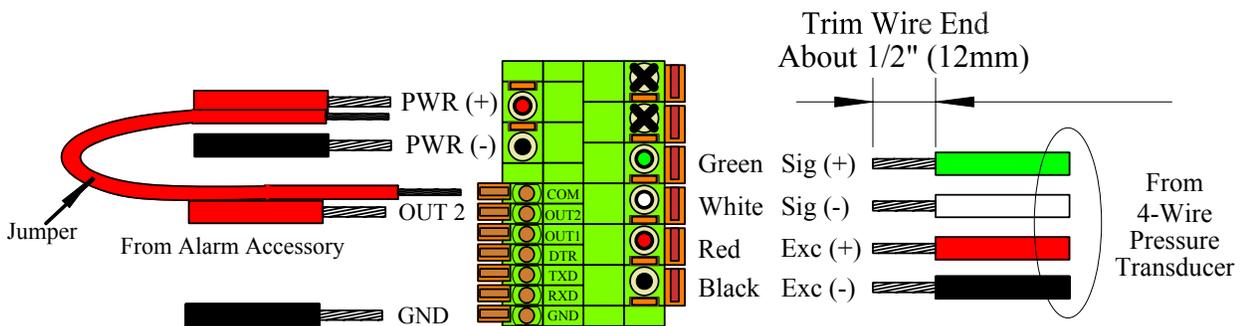
### Standard LTWS-1 Rinstrum Rear Panel Wiring



### LTWS-1 R-320 Indicator Rinstrum KT-40 Printer Wiring



### LTWS-1 R-320 Indicator Rear Panel Wiring with Remote Alarm Cable and Jumper



Install jumper (provided in Alarm Kit) from PWR (+) to COM Connect Alarm  
Cable RED wire to OUT 2  
Connect Alarm Cable BLACK Wire to GND  
Check to assure spring-clips grip wire, not insulation

# Operator Briefing

## Weighing Methods

Model LTWS-1 with Rinstrum Indicator

Hydraulic Weighing System

*Prepared by Technical Support 20 September, 2021*

**The key to accurate hydraulic weighing is consistency of operation.**

Examples of different weighing procedures which have produced desired weight consistency and accuracy:

### Simple Forklift Lift and Weigh method:

- Load the forks or lift
- Lower the lift mechanism to the ground
- Make the forks flat to the ground or adjust your lift for an equivalent, easily repeatable position relative to the ground.

*It may be useful to press the carriage down/slack the chains to provide a repeatable starting pressure.*

- When the display shows **READY**, lift at an idle or minimum repeatable lift speed. Lift the load about a foot and stop. Do not hesitate or vary the lift speed. Do not "feather" to a stop.
- Allow the scale to calculate and display the weight of the load. The stable display will show a small "H".

### Loader Tilt, Lift and Weigh" method:

This method is a basic process, if it can be utilized safely. In theory, when the mechanism is tilted back or tucked in, we eliminate errors caused by different tilt or tuck positions.

- Load the bucket.
- Tuck the bucket in.
- When the display shows **READY**, lift the load about a foot and stop.
- Allow the scale to calculate and display the weight of the load. The display will show a small "H".

The American Forklift Scale Model LTWS-1 hydraulic weighing firmware "Holds" the display once the lift has been made. The display will show a small "H". The display releases when the weight is removed from the machine for a second or two.

With no load and no lift pressure, the system will display **READY** to accept a new weight. When lifting objects which require that the object be loaded after the forks are lifted, it may be necessary to relieve the pressure (similar to putting the forks on the ground) before lifting to weigh. (See the next section.)

**Fork weighing method for spools and other similar loads:**

- Place the forks or spear in the core of the spool.
- Lower the lift mechanism to rest on the lower portion of the core.
- Make the forks flat inside the core provided that this does not endanger the operator or make the load unstable.
- *It may be useful to press the carriage down/slack the chains to provide a repeatable starting pressure.*
- When the display shows **READY**, lift the load about a foot and stop.  
Allow the scale to calculate and display the weight of the load.

**Weighing liquid, dangling and hanging loads:**

- Dangling and hanging loads in the normal weighing mode can be difficult to weigh on some machines. This is because the scale **ZERO** calibration is based upon the weight of the entire lifting assembly. First, try the standard weighing processes. One might work for your application.

For liquid and hanging or floppy loads, establishing a reliable empty-lift pressure (**READY**) may not be easily achieved because the load on the forks or lift cannot be settled while the cargo is loaded on the lift.

- You may attempt to rest the forks or lift on the load to relieve the hydraulic lift pressure before lifting.

If you are unable to achieve acceptable weights, please

**Contact Tech Support for assistance.**

**(805-236-7406)**

## POWER CHECK and Troubleshooting

### 1. POWER SOURCE

Check to be sure the system has primary DC power applied.  
Power should be between 8Vdc and 18Vdc if powered from truck electrical or greater than 6Vdc using fresh AA" batteries if utilizing internal battery pack.

### 2. POWER-UP

Press the small **UNITS**  (**Power**) button to turn on Indicator.  
The Indicator should show the Firmware version (A301 v4.02), then count down from 9 to 0 and then display **READY**.

### PRIMARY POWER PROBLEMS:

**If the system does not turn ON or not stay ON, or if the system turns OFF unexpectedly:**

1. If no characters are displayed, if no back light is seen, check the Primary Power wiring and connections.

Truck power should be in the range of 11 to 13.8Vdc.

If a Voltage Converter is installed, Primary Power to the Indicator should be the labeled Output Voltage +/- 20%

Check for correct Voltage polarity at the Indicator Connection.

Note: Use a Voltmeter, if possible, to verify that the proper Voltage and polarity is present at all test points.

If using internal dry cells, these batteries have a very limited operating life. Check the batteries.

2. If the wiring to the scale indicator is equipped with a fuse, check the fuse.

Note: The standard LTWS-1 hydraulic weighing systems normally consume less than 0.200 Amperes (200 milli-Amp).

The purpose of a in-line fuse is to protect the truck electrical from a catastrophic short in the weighing system electronics and electrical wiring.

This fuse rating should be in the range of 1.0 Amperes to 10 Amperes.

3. When measuring Primary Truck Voltage, the indicated Truck Voltage should not vary by more than about 0.1 V between when the indicator is turned ON and turned OFF.

Truck electrical systems, especially older trucks, commonly utilize the truck frame as the common or negative connection to the battery. It is not unusual to experience high resistance caused by corrosion or loose fitting of the elements of the chassis between the battery terminal and the primary power to the indicator.

This condition can produce an open circuit Voltmeter indication of satisfactory Voltage, because the resistance of degraded continuity is difficult to detect in an open circuit. Degraded circuit/wire/ground connections can often be detected by detecting the difference in Voltage at the load when OFF and when ON. Resistance of degraded connections will prevent full Voltage when the circuit load (Indicator) is ON.

If possible, turn the Indicator ON and OFF while monitoring the primary power Voltage. Be alert for a significant drop in Voltage when the system is turned ON.

For example if the open circuit Voltage is 11.5 and drops to 10 V or 9.5 V etc. when the indicator is turned ON, this change is an indication that the system battery may need to be charged or that continuity of the conductors and connections between the battery to the indicator may have been degraded by corrosion or loosening, etc.

4. During testing, move the Indicator in its bracket while monitoring the Primary Voltage.

The Indicator should not turn OFF. Watch for any disturbance in the display (if the Power problem is intermittent).

Voltage readings and Indicator Display should show no aberrations, flicker, etc.

If movement of the Indicator affects the Primary Power, test each power connection.

If Primary Power is delivered via a plug at the side of the Indicator, check that the plug is the correct size to fit the barrel and also the center pin. Install the correct size plug if this connection is physically sloppy or electrically intermittent. Alternately, remove the plug and wire the power directly to the internal **Euro** power terminals.

If power is hard-wired to the internal **Euro** connections of the rear panel, remove the rear cover and check the internal power wiring for connection and continuity.

The **Euro** connections are spring-loaded with an internal knife-edge. The insulation of the wires inserted in these terminals should have the insulation trimmed back to expose at least 3/8 inch or 10mm of bare wire.

The bare wire strands would be twisted so that there are no flying" strands and so that the twisted wire may be inserted smoothly into the **Euro** connector block connection.

Depress the loading tab, insert the twisted wire, release the loading tab. Now, give the wire a gentle tug to seat the internal clamp and assure that the wire does not slip loose.

5. Internal dry cell batteries may be discharged to below minimum Voltage required to operate and will cause the Indicator to turn Off. Operating life with Internal Batteries is limited and will vary with the type/chemistry of the batteries installed. Lithium batteries provide the longest operating time and carbon-zinc batteries provide very short operating life.

# 2021-2022 LTWS-1 Initial Indicator Setup Procedure

Press the **POWER** button to turn on the indicator. The display will show "READY".



Press **POWER** and "**F**" (**OK**) buttons, hold them both until the display shows "FULL SETUP".



Release the buttons.  
The display will then show "BUILD"



Press the **TARE** button one time to go to **DP** (Decimal Point) displayed on the Indicator.

Press **SELECT** button. Verify that this number is **000000** *with no decimal points*. If good, press the "**F**" (**OK**) button to save this setting and continue.



(If this value is not correct, you can change this value using the **SELECT** button to choose the digit and the **PRINT** button to remove a decimal point.



Press the "**F**" (**OK**) button to save the correct setting.)  
**DP** will be displayed on the Indicator.



Press the **TARE** button one time to go to **CAP** (Truck lift Capacity).

Press **SELECT** button.

Enter your truck's Truck lift Capacity  
Press **SELECT** to select a flashing digit.  
Use **PRINT** to change the number value.



Press the "**F**" (**OK**) button to save this setting and continue.

**CAP** will be displayed on the Indicator.



Press the **TARE** button one time to go to **RES** (Display Resolution/Increment) displayed on the Indicator.



Press **SELECT** button.

Press **PRINT** to select Display Resolution.

Enter **10** for **CAP** settings up to 10,000 lb. Enter **20** for higher **CAP** settings.



Press the "**F**" (**OK**) button to save this setting and continue. **RES** will be displayed on the Indicator.



Press the **TARE** button one time to go to **UNITS** (lb, kg, etc.) to be displayed on the Indicator.

Press **SELECT** button.

Press **PRINT** to select pounds (**lb**) or kilograms (**kg**). Press the "**F**" (**OK**) button to save this setting and continue.

**UNITS** will be displayed on the Indicator.



Press the **TARE** button one time to go to **HIRES** (High Resolution) displayed on the Indicator.

Press **SELECT** button.

The display should show **OFF**.

If necessary, press **PRINT** to select **OFF**.



Press the "**F**" (**OK**) button to save this setting and continue.

**HIRES** will be displayed on the Indicator.



Press the **TARE** button one time to go to **CABLE** (Transducer Cable Conductors) displayed on the Indicator.

Press **SELECT** button. The display should show **4**.

If necessary, press **PRINT** to select **4**.



Press the "**F**" (**OK**) button to save this setting and continue. **CABLE** will be displayed on the Indicator.



Press the **ZERO** button two (2) times to go to **OPTION** (Indicator Mode) displayed on the Indicator.



Press the **TARE** button one (1) time to go to **USE** displayed on the Indicator.



Press **SELECT** button. Display should show **Indust** (Industrial) .  
If necessary, press **PRINT** to select **Indust**.  
Press the "F" (**OK**) button to save this setting and continue.



**USE** will be displayed on the Indicator.



Press the **TARE** button one time to go to **Filter** (Number of Signal averaging) displayed on the Indicator.  
Press **SELECT** button.



Press **PRINT** to select **2.0**.  
Press the "F" (**OK**) button to save this setting and continue.



**Filter** will be displayed on the Indicator.



Press the **TARE** button one time to go to **MOTION** (Tolerance of Signal Change) displayed on the Indicator.  
Press **SELECT** button.



Press **PRINT** to select **1.0-1.0**.  
Press the "F" (**OK**) button to save this setting and continue.



**MOTION** will be displayed on the Indicator.



Press the **TARE** button one time to go to **Init.Z** (Automatic Set Initial **ZERO**) displayed on the Indicator.  
Press **SELECT** button.



Press **PRINT** to select **OFF**.  
Press the "**F**" (**OK**) button to save this setting and continue.



**Init.Z** will be displayed on the Indicator.



Press the **TARE** button one time to go to **Z.Trac** (Tolerance for **ZERO** Tracking) displayed on the Indicator.  
Press **SELECT** button.



Press **PRINT** to select **OFF**.  
Press the "**F**" (**OK**) button to save this setting and continue.



**Z.Trac** will be displayed on the Indicator.



Press the **TARE** button one time to go to **Z.Range** (Zero Adjustment Range) displayed on the Indicator.  
Press **SELECT** button.



Press **PRINT** to select **FULL**.  
Press the "**F**" (**OK**) button to save this setting and continue.



**Z.Range** will be displayed on the Indicator.



Press the **TARE** button one time to go to **Z.band** (Allowable Weight Range to Register "0" on the Display) displayed on the Indicator.

Press **SELECT** button.



Enter **000050**

Press **SELECT** to select a flashing digit. Use **PRINT** to change the number value. Press the "**F**" (**OK**) button to save this setting and continue.

**Z.band** will be displayed on the Indicator.

Press the **ZERO** button two (2) times to go to **FORK** (Hydraulic Processing) displayed on the Indicator.

Press the **TARE** button one (1) time to go to **START** displayed on the Indicator.

Select the **AUTO** option with the **PRINT** button.

Save your selection by pressing the "**F**" (**OK**) button. **AUTO** will be displayed on the Indicator.

Press the **ZERO** button eight (8) times to go to **END**. Press the **TARE** button.

The Indicator will display **SAVING**, then return to the weighing mode.

Turn the scale power **OFF** with the small **POWER** button.

*(It is good practice - but unnecessary - to turn the Indicator Off, then re-power to assure proper storage of Setup details in non-volatile memory.)*

This completes the Initial Indicator Setup.

\* \* \* \* \*



## 2021-2022 LTWS-1 Initial Calibration Procedure

### **Preliminary Considerations:**

#### **Prepare a Test Weight of known weight.**

You want a test weight that you know the actual weight. Guesses can work, but may require a later adjustment of the initial calibration.

When the ("H") is displayed under the right hand digits. The ("H") icon means the internal calculations for weight have been completed. The displayed weight is frozen and will not change until the load is removed.)

An ideal situation is to provide a test load of known weight where the weight is 30% or more of the truck lift capacity. This procedure makes the presumption that your test weight complies.

**Continue to Calibration -> .**

## Initial CALIBRATION PROCEDURE:

Press the **POWER** button to turn on the indicator. The display will show "READY".



Press **POWER** and "F" buttons, hold them both until the display shows "FULL SETUP". Release the buttons.



The Display will show **BUILD**.

Press the **ZERO** button three (3) times to go to **CAL**.



Press the **TARE** one (1) time to go to **ZERO**.

Press **SELECT** button one (1) time.



Starting from the ground (no pressure on the lift cylinder), lift your empty forks or bucket about a foot and **IMMEDIATELY** press the "F" (OK) button to save the pressure without going into bleed-off.

The display should momentarily show **Z.in P**, then flash "0" or "-10" etc.



Press the **TARE** one (2) times to go to **SPAN**.

Press **SELECT** button two (2) times. Enter the weight of your calibration test load.



Press **SELECT** to select a flashing digit. Use **PRINT** to change the number value.

Lift the test weight, stop and **IMMEDIATELY** press the "F" (OK) button to save this setting.

*(Do not delay pressing the "F" (OK) button or you will allow bleed-off which can create serious calibration difficulty in the attempted calibration or adjustment.)*

Press the **ZERO** button seven (7) times to go to **END**.

Press the **TARE** button.

The Indicator will display **SAVING**, then return to the weighing mode.



Lower the test load.

### Verify Calibration:

*The displayed weights during this process are not expected to match the actual test load weight. The purpose is to establish reliable repeatability of the calculated weight.*

When the display shows "READY":

Without moving the truck, lift the test weight to check calibration.

When the ("H") icon appears, note the displayed weight. *(This weight is an intermediate calculation. It is useful, but not accurate, yet.)*

Lower the test load, wait for "READY", and without moving the truck, lift the test load again to collect a new weight.

Note this new weight. It will be the first adjusted weight reading.

Lower the test load, wait for "READY", and without moving the truck. lift the test load again to collect a new weight.

Note this new weight. It will be the second adjusted weight reading.

Lower the test load.

**Check for consistency:**

Move the truck about twenty feet and return to the load, get under the load prepared to lift.

Wait for "READY", and without moving the truck, lift the test load to collect a new weight.

Note this new weight. It will be the first sample to evaluate consistency of the adjusted calibration.

Lower the test load.

Move the truck about twenty feet and return to the load, get under the load prepared to lift.

Wait for "READY", and without moving the truck, lift the test load to collect a new weight.

Note this new weight. It will be the second sample to evaluate consistency of the adjusted calibration..

Lower the test load.

Move the truck about twenty feet and return to the load, get under the load prepared to lift.

Wait for "READY", and without moving the truck, lift the test load to collect a new weight.

Note this new weight. It will be the final sample to evaluate consistency of the adjusted calibration.

Lower the test load.



**Evaluate the weights collected during truck moves.**

1. The weights should be within 1% to 2% of each other in either direction. *(A window of 2% to 4% of the test weight value. For example, if the test load weight shows 460 lbs, the variation between the three displayed weights should range between +/- 10 to +/- 20 pounds. The target weight (test weight) should be relatively between the high and low samples.)*

If the variation exceeds this recommendation, truck operation should be carefully examined to improve consistency of physical operation with special attention to lift speed and variation, mast tilt, position of the load on the forks and type of load. *(Flopping, swinging or sloshing loads can produce significant repeatability error.)*

2. If repeatability is satisfactory, proceed to correct for accuracy as follows;

Press the **POWER** button to turn on the indicator. The display will show "**READY**".  
 Press **POWER** and "**F**" buttons, hold them both until the display shows "**FULL SETUP**". Release the buttons.  
 The Display will show **BUILD**.

Press the **ZERO** button three (3) times to go to **CAL**.

Press the **TARE** one (2) times to go to **SPAN**.

Press **SELECT** button two (2) times. Enter the corrected weight of your calibration test load.

**(Examples:)**

***Displayed weight too high:***

*If the known weight is 2,000 pounds and the displayed weight is 2,100 pounds, (100 pounds high), adjust by reducing the **last calibrated weight** by 1/2 of the 100 pound error (-50 pounds). This will **reduce** the displayed weight. (Do not confuse the displayed weight with the last calibration weight!)*

***Displayed weight too low:***

*If the known weight is 2,000 pounds and the displayed weight is 1,900 pounds, (100 pounds low), adjust by increasing the **last calibrated weight** by 1/2 of the 100 pound error (+50 pounds). This will **increase** the displayed weight. (Do not confuse the displayed weight with the last calibration weight!)*

Press **SELECT** to select a flashing digit. Use **PRINT** to change the number value.  
 Lift the test weight, stop and **IMMEDIATELY** press the "**F**" (**OK**) button to save this setting.

*(Do not delay pressing the "**F**" (**OK**) button or you will allow bleed-off which can create serious difficulty in the attempted calibration or adjustment.)*

Press the **ZERO** button seven (7) times to go to **END**.

Press the **TARE** button.

The Indicator will display **SAVING**, then return to the weighing mode

**Lower the test load.**

When the display shows "**READY**":

Without moving the truck, lift the test weight to check calibration.

When the ("**H**") icon appears, note the displayed weight. *(This weight is an intermediate calculation. It is useful, but not accurate, yet.)*



Lower the test load, wait for "READY", and without moving the truck. lift the test load again to collect a new weight. Note this new weight. It will be the first adjusted weight reading.

Lower the test load, wait for "READY", and without moving the truck. lift the test load again to collect a new weight. Note this new weight. It will be the second adjusted weight reading.

Lower the test load.

**Check for consistency:**

Move the truck about twenty feet and return to the load, get under the load prepared to lift

Wait for "READY", and without moving the truck. lift the test load to collect a new weight. Note this new weight. It will be the first sample to evaluate consistency of the adjusted calibration.

Lower the test load.

Move the truck about twenty feet and return to the load, get under the load prepared to lift.

Wait for "READY", and without moving the truck. lift the test load to collect a new weight.

Note this new weight. It will be the second sample to evaluate consistency of the adjusted calibration.

Lower the test load.

Move the truck about twenty feet and return to the load, get under the load prepared to lift.

Wait for "READY", and without moving the truck. lift the test load to collect a new weight.

Note this new weight. It will be the final sample to evaluate consistency of the adjusted calibration.

Lower the test load.

Evaluate the weights collected during truck moves.

1. The weights should be within 1% to 2% of each other in either direction. *(A window of 2% to 4% of the test weight value*

*For example, if the test load weight shows 460 lbs, the variation between the three displayed weights should range between +/- 10 to +/- 20 pounds. The target weight (test weight) should be relatively between the high and low samples.)*

If the variation exceeds this recommendation, truck operation should be carefully examined to improve consistency of physical operation with special attention to lift speed and variation, mast tilt, position of the load on the forks and type of load. *(Flopping, swinging or sloshing loads can produce significant repeatability error.)*

2. If repeatability is not satisfactory, repeat this adjustment process until an acceptable and repeatable weighing result is achieved.

Final note: In pragmatic weighing solutions, the end user may prefer a slightly higher or lower weigh display, depending upon management preferences for the weighing application. The details of error correction may be modified slightly to accommodate accuracy offset preferences.

**This completes the Initial Calibration Procedure.**

## 2021 LTWS-1 Accuracy Adjustment Procedure

Prepare a Test Weight of known weight.

You want a test weight that you know the actual weight. Guesses can work, but may require a later adjustment of the initial calibration.

Begin by lifting your load of known weight. When the ("H") is displayed under the right hand digits, the displayed weight is frozen and will not change until the load is removed. The ("H") icon means the internal calculations for weight have been completed.

Note the displayed weight value.

Press **POWER** and "F" buttons, hold them both until the display shows "FULL SETUP".  
Release the buttons.

The Display will show **BUILD**.



Press the **ZERO** button three (3) times to go to **CAL**.



Press the **TARE** two (2) times to go to **SPAN**.

Press **SELECT** button two (2) times.



Enter a new calibration weight which corrects the error of the displayed weight by 1/2 (half) of the error.

### (Examples:)

#### ***Displayed weight too high:***

*If the known weight is 2,000 pounds and the displayed weight is 2,100 pounds, (100 pounds high), adjust by reducing the **last calibrated weight** by 1/2 of the 100 pound error (-50 pounds). This will **reduce** the displayed weight. (Do not confuse the displayed weight with the last calibration weight!)*

#### ***Displayed weight too low:***

*If the known weight is 2,000 pounds and the displayed weight is 1,900 pounds, (100 pounds low), adjust by increasing the **last calibrated weight** by 1/2 of the 100 pound error (+50 pounds). This will **increase** the displayed weight. (Do not confuse the displayed weight with the last calibration weight!)*

*(Do not delay pressing the "F" (OK) button or you will allow bleed-off which can create serious difficulty in the attempted calibration or adjustment.)*

Press the **ZERO** button seven (7) times to go to **END**.

Press the **TARE** button.

The Indicator will display **SAVING**, then return to the weighing mode.

Lower the test load.

Verify correction:

The displayed weights during this process are not expected to match the test load weight. The purpose is to establish reliable repeatability of the new calculated weight.

When the display shows "**READY**":

Without moving the truck, lift the test weight to check calibration.

When the ("**H**") icon appears, note the displayed weight. (This weight is an intermediate calculation. It is useful, but not accurate, yet.)

Lower the test load, wait for "**READY**", and without moving the truck. lift the test load again to collect a new weight.

Note this new weight. It will be the first adjusted weight reading.

Lower the test load, wait for "**READY**", and without moving the truck. lift the test load again to collect a new weight.

Note this new weight. It will be the second adjusted weight reading.

Lower the test load.

### **Check for consistency:**

Move the truck about twenty feet and return to the load, get under the load prepared to lift.

Wait for "**READY**", and without moving the truck. lift the test load to collect a new weight.

Note this new weight. It will be the first sample to evaluate consistency of the adjusted calibration.

Lower and remove the test load.

Move the truck about twenty feet and return to the load, get under the load prepared to lift.

Wait for "**READY**", and without moving the truck. lift the test load to collect a new weight.

Note this new weight. It will be the second sample to evaluate consistency of the adjusted calibration.

Lower the test load.

Move the truck about twenty feet and return to the load, get under the load prepared to lift.

Wait for "**READY**", and without moving the truck. lift the test load to collect a new weight.

Note this new weight. It will be the final sample to evaluate consistency of the adjusted calibration..

Lower the test load.

Evaluate the weights collected during truck moves.

1. The weights should be within 1% to 2% of each other in either direction. *(A window of 2% to 4% of the test weight value.)*

*For example, if the test load weight shows 460 lbs, the variation between the three displayed weights should range between +/- 10 to +/- 20 pounds. The target weight (test weight) should be relatively between the high and low samples.)*

If the variation exceeds this recommendation, truck operation should be carefully examined to improve consistency of physical operation with special attention to lift speed and variation, mast tilt, position of the load on the forks and type of load. *(Flopping, swinging or sloshing loads can produce significant repeatability errors.)*

2. If repeatability is not satisfactory, repeat this adjustment process until an acceptable and repeatable weighing activity is achieved.

Final note: In pragmatic weighing solutions, the end user may prefer a slightly higher or lower weigh display, depending upon management preferences for the weighing application. The details of error correction may be modified slightly to accommodate accuracy offset preferences.

**This completes the Accuracy Adjustment.**

## Appendix of Useful Information

**23** - Key-Lock Procedure

**24** - Comments On Bleed-off

**25** - Discussion on Differences Between Hydraulic and Load Cell Weighing

**26** - Accumulator - Totalize

**27** - Misc.



## American Forklift Scale

6100 Horseshoe Bar Rd. Suite A-326  
Loomis, CA 95650  
(888) 640-2725

sales@americanforkliftscale.com

**Technical Support 24-7 Call (805) 236-7406**

### American Forklift Scale Model LTWS-1 with Rinstrum Model R320 Firmware A309 v4.02

#### Procedure to Disable or Restore Individual Key Operation

##### Key Identification:

| Label         | Key # |
|---------------|-------|
| UNITS (Power) | P     |
| ZERO (0)      | 1     |
| TARE (T)      | 2     |
| SELECT        | 3     |
| PRINT         | 4     |
| OK (f)        | 5     |

##### Procedure:

1. Press POWER and "F", hold them together until the display shows FULLSETUP, then release the buttons.
2. The display will next show BUILD.
3. Press ZERO Button several times to go to SPEC.
4. Press the TARE Button three (3) time to go to KEY.LOC
5. Press the SELECT Button. The display will show P12345
6. Select the key that you want to lock (make inactive) with the SELECT Button.
7. Press PRINT to change the Key number to a dash (-).
8. Repeat for additional Key disable.
9. Press the 'F' Button to save.
10. Press the ZERO Button several times to go to END.
11. Press TARE. The display will show SAVING and return to the weighing mode.
12. To enable a disabled Key, use the same process, but restore the Key number for the (-).
13. If you replace "P" with a dash (-), the POWER Button will be disabled.

## Bleed-Off

*Best hydraulic weights are collected immediately after stopping the lift.*

Hydraulic pressure lifting a load will change immediately when the lift is stopped. This is caused by bleed-off, the normal leakage of hydraulic fluid past o-rings, seals and valves.

- **Operations that affect weight consistency:**
- Bleed-off
- Engine RPM
- Hydraulic Pump RPM
- Mast Tilt
- Fork Offset/Sideshift/Multi-stage position, etc
- Position of Load on fork
- Speed or Height of lift
- Feathering/Babying or variation of lift speed.
- Electronic Proportional/Automated Features

The stable weight display (**H**) is held until the load is removed.

A new load may be weighed only when the Display shows "**READY**".

**Summary:** These are not hard and fast rules", but only suggestions. Only you can determine the correct" operation to produce best results. (Some trucks weigh best at idle.

Most hydraulic scale installations produce consistent 98-99% accuracy.

The only correct operation is the one that you find produces the best consistent weights. You can trim a constant weight to be a consistent **and accurate** weight.

**You can make it happen. Tech Support can assist 24-7: 805-236-7406**

### A Final Reminder . . .

**Safety is the First Operating Consideration.**

**Help reduce workplace accidents.**

**Keep your own operation SAFE.**

\* \* \*

## Evaluating The American Forklift Scale Hydraulic Weighing Systems Comments and Advice From Technical Support for Accurate Hydraulic Weighing

American Forklift Scale proprietary firmware is developed specifically to capture accurate and reliable weights derived from the dynamic lift pressures during the mechanical/hydraulic lifting cycle.

These scales are typically defined as "check-weigh" systems.  
With low weight (light) loads, hydraulic weighing systems do not perform well as "package scales."

### Hydraulic weighing compared to load cell weighing:

*(Weighing with hydraulics is different from weighing with load cells.)*

Most electronic scale elements are capable of providing +/- 1/10% (+/- 1 pound/kilo error per 1,000 pound/kilo load. Most load cells are capable of even greater accuracy.

Most weighing errors in hydraulic weighing systems are induced by less than perfect mechanical system components and inconsistent operation.

Lift trucks are designed to be efficient in load operations. Weighing is not an ordinary design consideration.

Load cells are designed to provide an accurate specific signal for a specific fixed load range.

Load cell-based forklift weighing accuracy commonly achieves around +/- 0.1% of the rated scale capacity. If your application requires this greater accuracy, please contact **Technical Support** for advice.

### **Hydraulic pressure sensors are designed to provide a specific signal for a pressure which will vary with load range.**

Pressure per load range varies with the mechanical hydraulic system design, especially piston and cylinder size.

Lift pressure (and signal) varies directly with the area of the piston/cylinder.

Due to these design factors and operator variations, hydraulic weighing can often achieve +/- 2% or better of scale rated capacity.

### **Any factor that affects hydraulic pressure will induce a displayed weight error.**

In short, *hydraulic weighing is not absolute*. The *results are relative* to the hydraulic lift system design, condition and calibration. We discourage the use of the "ZERO" button.

### **Examples of potential hydraulic weighing error sources:**

Mast Tilt can produce significant weigh error

Erratic lift speed destroys analysis of lift pressure profile

Internal combustion drive - engine rpm changes produce hydraulic pump pressure and flow variations, which produce displayed weight errors

Corrosion, dirt, debris and wear and tear of the chains, slides and rollers produce erratic movement of the load during lift. These variations are often random and may not be possible to reduce by setup compensation.

Seal and o-ring condition, wear, material decomposition and other degradation can cause weighing errors. However, older machines with "worn-in" seals and etc, may provide better consistency of lift pressure per load than new machines.

Position of the load on the forks will change fork leverage and distribution of weight. These cause variations of friction between the carriage and mast, subsequently altering the pressure necessary for the lift. Variations are expressed as weigh errors.

## Tech Notes: LTWS-1 Patriot

### RINSTRUM Indicator Accumulate/Totalize Function

#### Operator Instructions:

Initiate the Accumulate/Totalize/Store function by clearing the Accumulator Memory. Press and hold the **PRINT**  button until the display indicates the memory is clear and displays the Total = **0**. The Instrument will then display **READY**.

#### Load must be stable:

The Indicator will **Accumulate/Totalize** when you press the **PRINT**  after the weight is stable and the small **H** appears below and between the 1's digit and the **lb/kg** sign.

#### ACQUIRE and STORE Weight:

When the **PRINT/(STORE)** button is pressed momentarily, the Indicator will flash **PRINT** to indicate that the Store function is successful.

The stored weight is in the accumulated load memory (**TOTAL**).

The Indicator will **Accumulate/Totalize/(Store)** only one weight per **PRINT/STORE**.

In order to **store** a new weight, the forks must be unloaded and re-loaded to calculate and add a new weight.

The Indicator will display - - - - - if **PRINT/STORE** is attempted without acquiring a new load and weight.

#### PRINT Accumulated **TOTAL** and CLEAR **TOTAL** (Accumulated Weight)

The accumulated **TOTAL** weight will be displayed and **PRINT**ed if the **PRINT** button is pressed and held.

When the Accumulated Weight is **PRINT**ed, the **TOTAL** Weight Memory is erased.

The accumulated **TOTAL** weight may be viewed when the **f**  button is pressed and held. Viewing the accumulated **TOTAL** weight does **NOT** erase the weight memory.

#### Clear the Accumulator Memory.

Press and hold the **PRINT**  button until the display indicates the memory is clear and displays the Total = **0**.

## Appendix - Miscellaneous Comments

**There are many topics not covered in this brief Guide. Please contact Tech Support for many topics not described here.**

### **No true hydraulic ZERO**

Unlike load cells, there is no true ZERO for practical hydraulic weighing. "ZERO" is simply just another weight, subject to all normal weighing errors. We highly recommend that the "ZERO" button NOT be used after final calibration.

### **Common factors for hydraulic weighing consideration:**

Weighing beginning at a height is not allowed by the automated pressure profile process. All weighing must be performed beginning from the ground.

New weights must be started from the ground, after the pressure from a previous lift has been dissipated and the scale shows "**READY**".

Liquid loads, hanging/swinging loads, long, flexing loads that "bounce" and similar dynamic loads are difficult to weigh accurately due to inertial load transitions.

### **Light Loads:**

Hydraulic weighing is intended to satisfy check-weigh requirements. For most industrial applications, accuracy is acceptable. However, the hydraulic process on a 5,000 or 10,000 pound capacity truck is not suitable for package and parcel weighing.

Persistent conditions that cause hydraulic variations such as slide and roller friction, leaky or sticky seals and o-rings and so on, require about the same pressure to overcome at low loads as are experienced at higher loads. This means that the displayed weight errors at low weights may become unacceptable. Low weight errors often become problematic at loads below about 10% of gross lift/ weigh capacity.

We invite and encourage your staff to employ our risk-free 21 Day Test Drive program for a hands-on evaluation for your specific truck and weighing requirements. We will ship the LTWS-1 system on a conditional order.

Your obligation will be freight to and from your facility, your own costs for installation and test labor. Our Technical Support Representative will work with your technician to set up, calibrate and test the scale in your application. The setup and calibration process normally takes between 20 and 60 minutes. During this initial process, our representative will work with your technician to develop a best practice method for acquiring accurate and repeatable weights for your truck and weighing application.

**Our telephone Technical Support is unlimited  
and available 24-7, (holidays included)  
at 805-236-7406.**

# NOTES

## NOTES



**Forklift and Loader  
Hydraulic Weighing Systems**  
by  
**American Forklift Scale LLC**

6100 Horseshoe Bar Road  
Suite A-326  
Loomis, CA 95650

**Tel: 888-640-2725**  
**FAX: 916-660-0679**

[\*\*sales@americanforkliftscale.com\*\*](mailto:sales@americanforkliftscale.com)

[\*\*https://www.americanforkliftscale.com/\*\*](https://www.americanforkliftscale.com/)

**Technical Support 24-7**  
[\*\*tech@americanforkliftscale.com\*\*](mailto:tech@americanforkliftscale.com)  
**(Cell) 805-236-7406**

**For Advice and Assistance with:**

**Installation Setup**  
**Calibration**  
**Operation**  
**Trouble-shooting**  
**Any Other Assistance**

**We are here to assist Dealers and Operators!**

**Please call on our experience.**

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