

**LOADRITE™**

BY ACTRONIC – A TRIMBLE COMPANY

# Calibration methods guide

# Excavator scales

## X2650





## LOADRITE™ X2650 Calibration methods guide

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A solution from



A TRIMBLE COMPANY

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# IMPORTANT SAFETY INFORMATION

PLEASE READ CAREFULLY BEFORE USING THE LOADRITE™ WEIGHING SYSTEM

	<p>This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.</p>
	<p>WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.</p>
	<p>CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.</p>
	<p>CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.</p>



It is your sole responsibility to place, secure and use the LOADRITE™ Weighing System in a manner that will not cause accidents, personal injury or property damage. Always observe safe operating practices.

Do not install the LOADRITE™ Weighing System in a way that may interfere with the safe operation of the vehicle, or deployment of safety equipment.

Before you use the LOADRITE™ Weighing System for the first time, familiarize yourself with the system and its operation.



Do not handle the LOADRITE™ Weighing System if it is hot. Let the product cool, out of direct sunlight.

Ensure that the LOADRITE™ Weighing System is connected to a power source with the correct fitting and voltage requirements.

Do not attempt to service the LOADRITE™ Weighing System as this could result in personal injury.



Removing LOADRITE™ Weighing System equipment or adding accessories could affect the accuracy of weighing data and your warranty.

Do not install cables over horizontal surfaces where they may be stood on or hit by falling objects.

**Failure to adhere to these warnings and cautions may lead to death, serious injury or property damage. Trimble Loadrite Auckland Ltd disclaims all liability for installation or use of the LOADRITE™ Weighing System that causes or contributes to death, injury or property damage, or that violates any law.**

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# 1. INTRODUCTION

Following installation of the hardware components of the X2650, the weighing System then needs to be set-up and calibrated to complete commissioning of the system. The purpose of this document is to detail the procedure and requirements to complete the calibration process.

The calibration consists of three parts:

- ▶ Zero Calibration,
- ▶ Span Calibration, and
- ▶ Scale Refinement.

The calibration process can be completed in as little as one hour depending on the method chosen. Once the *Span Calibration* has been completed, the excavator may return to normal production load-out. During this time the system will be monitored and a fine-tuning adjustment will be made to the Indicator.

# 2. ZERO CALIBRATION

The *Zero Calibration* process takes approximately 10-20 minutes to complete and can be performed by a certified excavator operator under the supervision and instruction of a LOADRITE™ technician.

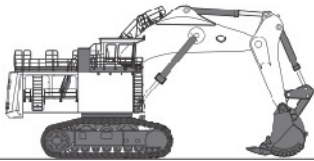
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**IMPORTANT:** It is important to ensure that the machine is warmed up and that the hydraulic system is at normal working temperature before conducting the calibration.

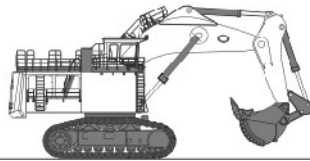
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The *Zero Calibration* consists of a series of five lifts with no material in the bucket. The machine is maneuvered into five different starting orientations and then lifting the boom to its maximum height. Illustrated below are the five different starting positions:

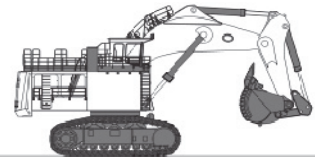
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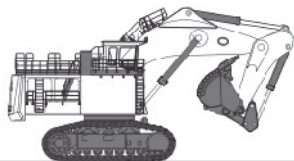
Lift 2



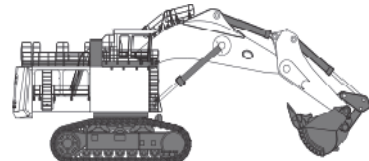
Lift 3



Lift 4



Lift 5

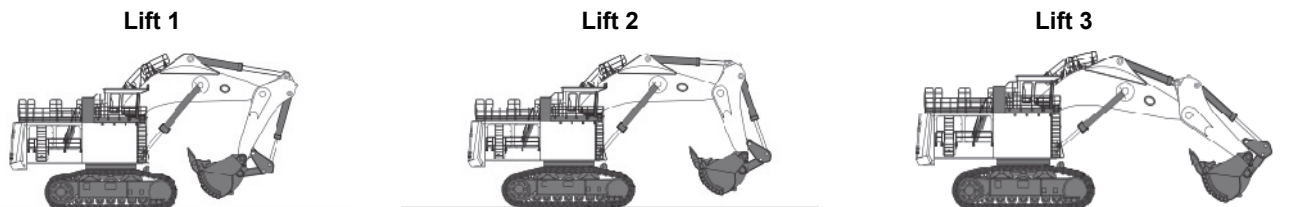


## 3. SPAN CALIBRATION

The *Span Calibration* process can be performed by a certified excavator operator under the supervision and instruction of a LOADRITE™ technician.

**IMPORTANT:** It is important to ensure that the machine is warmed up and that the hydraulic system is at normal working temperature before conducting the calibration.

For the *Span Calibration*, the bucket is loaded with material of either a known or estimated weight. The *Span Calibration* consists of three lifts as illustrated below. Each lift consists of maneuvering the machine into a defined starting orientation and then lifting the boom. The *Span calibration* duration can vary from 15min to 2 hours depending on the method used.



### 3.1. SPAN CALIBRATION METHOD 1: ESTIMATED CALIBRATION WEIGHT

This is the least time consuming method of *Span Calibration*, with an estimated duration of 15-30 minutes.

The bucket is filled with material from the site. Based on the specific gravity of the material and the volume of the bucket, the weight of the material in the bucket is estimated. This weight is entered into the Indicator and used for the calibration.

At the completion of the *Span Calibration*, the X2650 system will produce an estimated weight of the material in the bucket. This estimate is typically within 10% of the actual weight. Once this has been completed, the excavator can then start its normal load-out tasks.

### 3.2. SPAN CALIBRATION METHOD 2: KNOWN CALIBRATION WEIGHT

#### Test Weights

Known test weights may be used to calibrate the system. This will require sourcing sufficient test weights to achieve 2/3 (66%) of the machine payload capacity. For example, if the machine has a rated payload capacity of 40 tonnes, then the test weight must be 30 tonnes or greater. The weights must fit into the bucket and be representative of a normal load distribution within the bucket.

**TIP:** This method can be difficult to engineer and is not easily achieved.

#### Using a Wheel Loader System

If a suitably sized wheel loader is available on site to load material into the excavator bucket, a LOADRITE™ wheel loader system may be temporarily fitted to the loader. This will incur additional labor time and cost. It is important that this be planned before installation of the X2650 Weighing System.

The wheel loader will then be used to measure and load material into the bucket of the excavator. LOADRITE™ L-series wheel loader systems generate a payload accuracy of 1% or less, so this is a good method for determining the payload loaded into the excavator bucket.

## 4. SCALE REFINEMENT

Scale refinement is a simple process of fine-tuning the performance of the X2650 Weighing System. The process involves comparing the X2650 payload measurement performance with that of a secondary weighing device and then aligning the performance.

For example, if over ten haul trucks the X2650 system is found to be consistently producing payload weights heavier than the secondary device, (such as X2650 average weight of 295t and the secondary device average weight of 280t), the system will then be adjusted to align the results. This adjustment is a process of entering the two averaged values into the Indicator so the system can automatically perform the corrections.

It is understandable that the more precise and accurate the secondary device, the better the refinement of the X2650 will be.

### 4.1. SCALE REFINEMENT METHOD 1: HAUL TRUCK PAYLOAD SYSTEM COMPARISON

Aligning the X2650 payload estimation with the haul truck PLM systems is suggested as an intermediate step in order to minimize the impact on production until such time that a weight study can be conducted.

Once the calibration is completed, normal load-out may commence and a LOADRITE™ representative will monitor the payload information gathered from the X2650 system and compare that against the haul truck payload system. The data will be averaged over several vehicles and an adjustment will be made to the X2650 Indicator to align its payload results with that of the haul truck systems.

It must be noted that the X2650 will produce payload estimates based on the data input into the Indicator during the refinement. Therefore, if the haul truck systems are not accurate and consistent, the X2650 payload estimation will reflect that.

### 4.2. SCALE REFINEMENT METHOD 2: WEIGHT STUDY

For optimum weighing performance it is recommended that a weight study be conducted. A portable axle scale will be set up and commissioned on-site to monitor the truck payloads.

Similar to the previous *Scale Refinement* method, several trucks will be driven over the axle scale and the payload information gathered. The LOADRITE™ X2650 payload data will then be compared with the data from the axle scale and an adjustment made to the Indicator.

It is suggested that this type of comparison study be conducted in conjunction with scheduled weight studies or when several X2650 systems have been commissioned on site to minimize disruptions to production.




## 5. NORMAL OPERATION

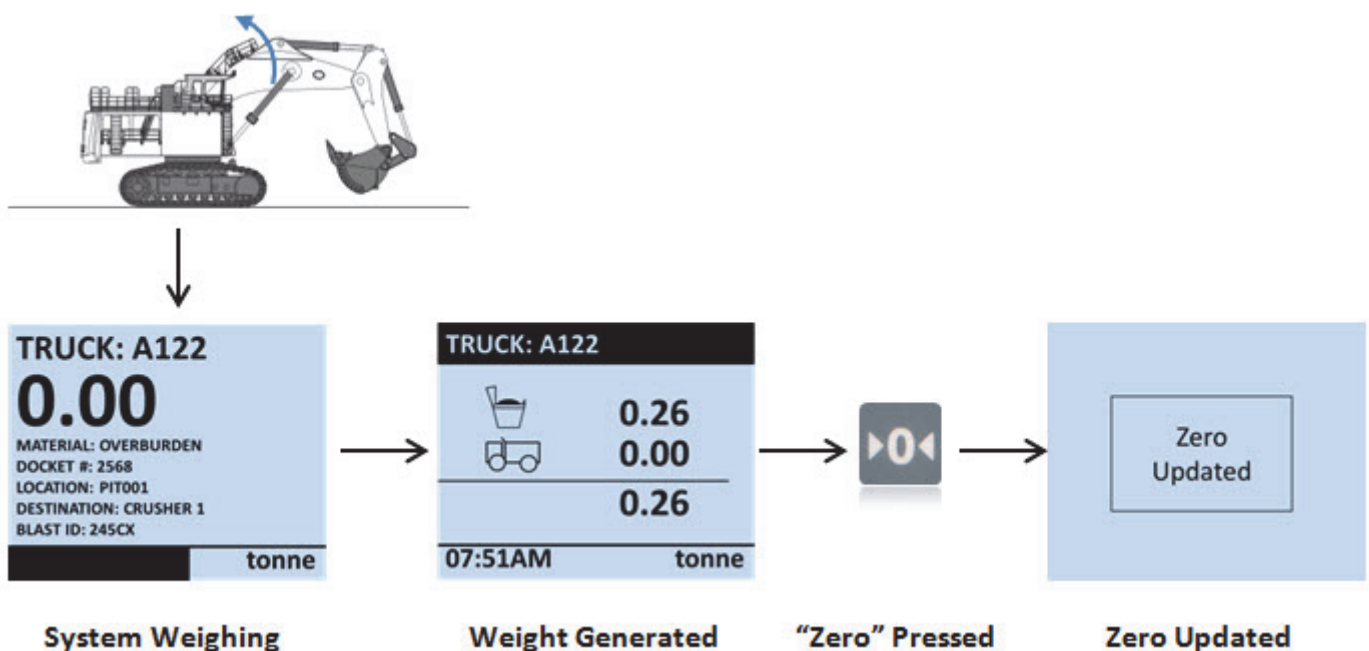
Following commissioning of the X2650, the excavator is able to resume normal operation. As with any weighing system, it is necessary to regularly tare the Indicator in order to maintain accurate weighing results. For the X2650 Weighing System, LOADRITE™ refer to this as *Zeroing* the scale. This should be done as a minimum at the beginning of each shift and when material has accumulated in the bucket (carry back). Zeroing the scale will account for wear of the bucket teeth, replacement of bucket teeth and also the repair of wear plates on the bucket.

If a new bucket is fitted to the excavator that is the same as the previous one, then after the bucket is fitted to the machine it should be zeroed to account for the weight of the new bucket.

### 5.1. HOW TO ZERO THE X2650

The process of zeroing the X2650 Weighing System is to simply perform a lift in the same manner as would normally be done when loading-out a truck, to generate a weight with no material in the bucket, then pressing  when the system has generated a weight.

The Zeroing process is illustrated below:



In the above example, the X2650 Weighing System has effectively tared the scale with a 260kg offset. This could either have been the addition of new teeth, wear plates or carry back in the bucket.

## 6. APPENDIX: LEGAL INFORMATION

### Disclaimer

Trimble Loadrite Auckland Ltd operates a policy of on-going development. Please note that while every effort has been made to ensure that the data given in this document is accurate, due to continued product development, the information, figures, illustrations, tables, specifications, and schematics contained herein are subject to change without notice. Trimble Loadrite Auckland Ltd does not warrant that this document is error-free. The screenshots and other presentations shown in this manual may differ from the actual screens and presentations generated by the actual product. All such differences are minor and the actual product will deliver the described functionality as presented in this document in all material respects. If you find any errors in the document, please report them to us in writing.

Trimble Loadrite Auckland Ltd assumes no liability in connection with the use of any LOADRITE™ branded product.

Trimble Loadrite Auckland Ltd is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

### Compliance

Domain	Applicable Standard
Immunity Standards (industrial)	IEC 61000-4-3 (ed1.2) Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test (80% 1kHz Amplitude Modulated) from 80MHz to 1GHz 10V/m  IEC 61000-4-3 (ed1.3) Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test (80% 1kHz Amplitude Modulated) from 1.4GHz to 2GHz 3V/m  IEC 61000-4-3 (ed1.4) Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test (80% 1kHz Amplitude Modulated) from 2GHz to 2.7GHz 1V/m
Conducted	IEC 61000-4-6 (ed2.1) Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
Fast Transients	IEC 61000-4-4 (ed2.1) Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test +/-1kV (5/50 Tr/Th ns - 5kHz repetition)
ESD	IEC 61000-4-2 Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test +/-4kV / Electrostatic Air Discharge +/-8kV
Electromagnetic compatibility (EMC)	EN/IEC/ASNZS 61000-6-2:2005 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments  EN/IEC 61000-6-4:2005 Electromagnetic compatibility (EMC) - Part 6-4: Generic Standards - Emission standard for industrial environments  ANSI C63.4:2003 FCC Part 15 (A and B) - Radio Frequency Devices



Products with the CE marking comply with the Electromagnetic Compatibility Directive (2004/108/EC) issued by the Commission of the European Community. Compliance with this directives implies conformity to the following European Standards:

EN 61000-6-2:2005 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

EN 61000-6-4:2005 Electromagnetic compatibility (EMC) - Part 6-4: Generic Standards - Emission standard for industrial environments

The Indicator is fully EMC (Electro-Magnetic Compatibility) compliant and is CE marked accordingly. A Declaration of Conformity, in accordance with the EMC Directive 89/336/EEC (and as amended) is available from Trimble Loadrite Auckland Ltd on request: [info@loadritescales.com](mailto:info@loadritescales.com)

Trimble Loadrite Auckland Ltd cannot be held responsible for modifications made by the User and the consequences thereof, which may alter the conformity of the product with CE marking.

Hereby, Trimble Loadrite Auckland Ltd, declares that this LOADRITE™ X2650 is in compliance with the essential requirements and other relevant provisions of Directive 2004/108/EC.

This LOADRITE™ product is explicitly excluded from the scope of EU RoHS 2 Directive 2011/65/EU in article 2, section (4), paragraphs: (d), (e), (f) and (g).

This device complies with part 15 of the FCC Rules and Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This Class A digital apparatus complies with Canadian ICES-003 (A) / NMB-003 (A).

**WARNING:** This product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm. This Notice is being provided in accordance with California's Proposition 65.

### Disposing of the LOADRITE™ Indicator

This electronic product is subject to the EU Directive 2002/96/EC for Waste Electrical and Electronic Equipment (WEEE) which requires the separate collection, treatment, recycling and environmentally-sound final disposal of waste of electrical and electronic equipment. As such, this product must not be disposed of at a municipal waste collection point.

Please refer to local regulations for directions on how to dispose of this product in an environmentally friendly manner.





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