Avery Weigh-Tronix

Weighing and Calibration Procedures for Weighline

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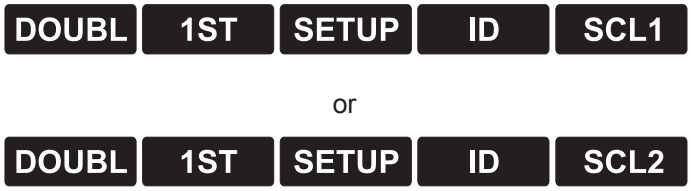
Introduction

Your system can start up in one of two modes:

Mode 1

This mode can be a multi-scale or a single-scale two draft weighing system. The first screen will show these soft keys:



or

Mode 2

This is a multi-scale full draft weighing system. The first screen will show these soft keys:

SETUP Soft Key

Pressing the **SETUP** soft key first prompts you for Setpoint #1 value followed by Setpoint #2 value. You may use this feature by adding OPTO modules and additional hardware to control filling or loading of cars. Setpoint values typically are less than system capacity. Reference the *Service Manual* for OPTO information and connections to them.

Manual Entry of Correction Factor

The last prompt under **SETUP** is for manual entry of Co-factor. This Co-factor or Correction Factor defaults to the value of 1 for each scale. If a Co-factor other than 1 is required, contact customer support at Weigh-Tronix at 1-800-458-7062.

ID Soft Key

Press the **ID** soft key and the display prompts the operator to enter a six character identifier. Use either letters or numbers to identify the car being weighed.

Weighing Procedures

Introduction

This guide explains the weighing and calibration procedures of the Weighline Track Scale when using the standard Weighline application.

Single Scale - Two Draft (Double) Static Weighing System

Follow these instructions for two draft, static weighing of a car with a single Weighline scale.

The following soft keys should be showing:

DOUBL	1ST	SETUP	ID	SCL1

1. With car clear of scale check that scale is showing zero weight. Press the **ZERO** key if it is not. . . Display shows ***0***.

2. Move the first truck of car onto the scale and position wheels in the center of the Weighline sections. See Figure 1. . . Indicator will display first truck weight.

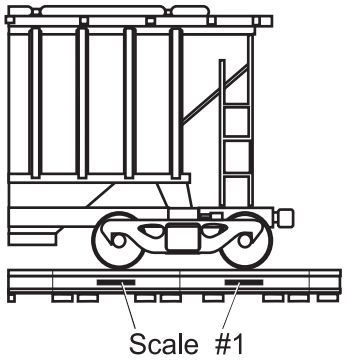


Figure 1
First truck positioned over scale

Scale should be used in the same direction as it was calibrated

3. Press the **1ST** key. . .

   1ST changes to ***2ND***. Display will show approximately twice the first truck weight. The first truck weight will also be displayed in smaller characters under the main weight display.

SINGL	2ND	SETUP	ID	SCL1

4. Move the car so that the second truck is on the scale.
   See Figure 2. . .

   Total car weight is displayed.

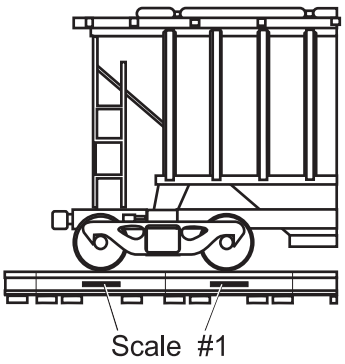


Figure 2
Second truck in position over scale

5. Press **PRINT** to print the weight.

6. Remove car and press the **2ND** key. . .

   2ND changes to ***1ST*** ready to weigh the first truck of the next car.

Two Scale Static System - Single or Full Draft Weighing

Follow these instructions for two scale, static weighing of a car. See Figure 3.

The following soft keys should be showing:

SINGL		SETUP	ID	SCL1

1. With car clear of scale check that scale is showing zero weight. If not, press the **ZERO** key. . . — The display shows ***0***.
2. Move the car onto the scale and position it so that all wheels are in the center of the Weighline sections. — Total car weight is displayed.
3. Press **PRINT** to print the weight.
4. Remove the car.

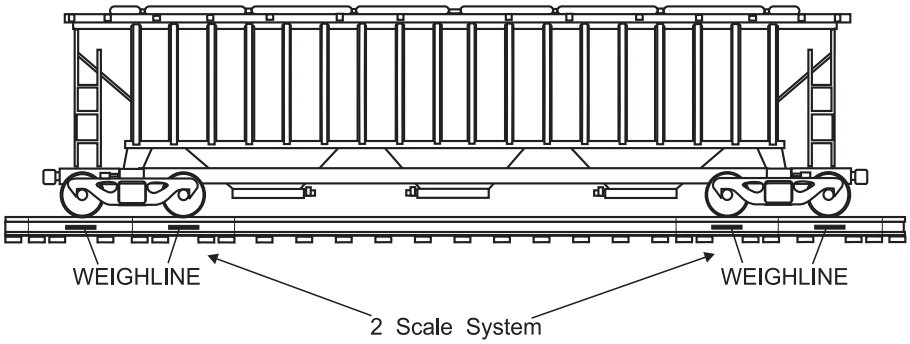


Figure 3
Two scale static system

Normal Two Draft Weighing - Two Scale Static System

When car trucks are shorter than the center lines of the two scales:

The following soft keys should be showing:

DOUBL	1ST	SETUP	ID	SCL1

1. With car clear of scale check that scale is showing zero. Press the ZERO key if it is not. . . — Display shows ***0***.

2. Move car so that rear truck is on the first scale and wheels positioned in the center of the Weighline sections. See Figure 4. — Display will show first truck weight.

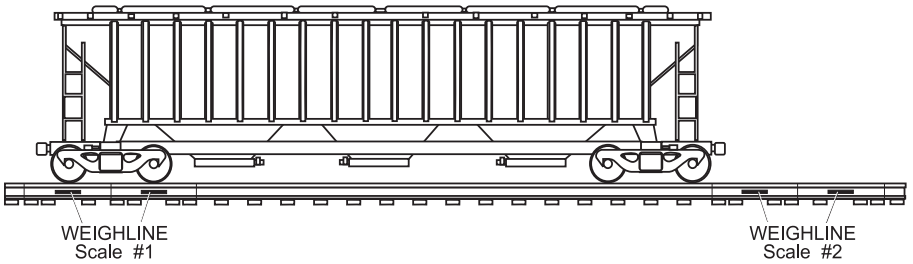


Figure 4
First truck over scale #1

3. Press the **1ST** key. — ***1ST*** will change to **2ND**. Display will show approximately twice the first truck weight. The first truck weight will also be displayed in smaller characters under the main Weight display.

4. Press the **SCL 1** key. — It will change to **SCL 2** and weight display will show the first truck weight.

5. Move the car so that second truck is on the second scale and wheels are positioned in the center of the Weighline sections. See Figure 5. — Total car weight is displayed.

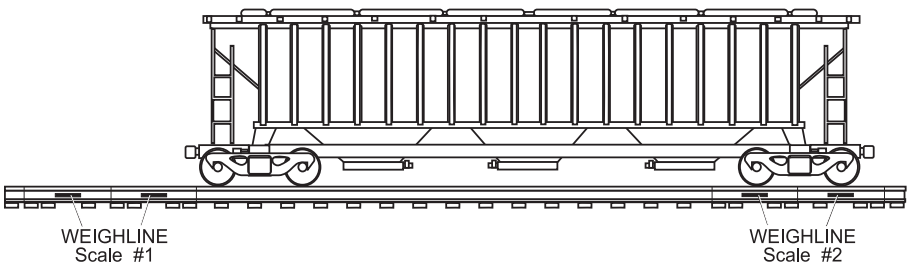


Figure 5
Second truck over scale #2

6. Press **PRINT** to print this weight.
7. Remove the car.

When car trucks are longer than the center lines of the two scales:

The following soft keys should be showing:

*If the **1ST** softkey says **2ND,** just press that softkey and the name will change back to **1ST**. The same is true for the **SCL 1/ SCL 2** key.*

1.	With the car clear of the scale check that scale is showing zero.	
2.	Move car so that front truck is on the second scale and wheels positioned in the center of the Weighline sections.	Indicator will display first truck weight.
3.	Press the **1ST** key. . .	Soft key display will change to **2ND** and display will show approximately twice the first truck weight. The first truck weight will also be displayed in smaller characters under the main Weight display.
4.	Press the **SCL 2** key.	Soft key will change to **SCL 1** and the weight will change to the first truck weight.
5.	Move the car so that the second truck is on the first scale and the wheels are positioned in the center of the Weighline sections.	Total car weight is displayed.
6.	Press **PRINT** to print this weight.	
7.	Remove the car.	

Cars should be weighed in the direction the scales were calibrated.

Two Scale Static System - Alternative Two Draft Weighing Mode

In addition to the normal two scale, two draft weighing mode, either scale may be used as a single scale for two draft weighing .

The following soft keys should be showing:

DOUBL	1ST	SETUP	ID	SCL1

or

DOUBL	1ST	SETUP	ID	SCL2

depending upon the scale selected.

1. With car clear of scale check that the scale is showing zero. Press the **ZERO** key if it is not. . .	Display shows ***0.***
2. Move first truck of car onto the scale and position wheels in the center of the Weighline sections. . .	Indicator will display the first truck weight.
3. Press **1ST** key. . .	Display will change to **2ND**. Display will show approximately twice the first truck weight. The first truck weight will also be displayed in smaller characters under the main weight display.
4. Move car so that the second truck is on the scale. . .	Total car weight is displayed.
5. Press **PRINT** to print the weight.	
6. Remove car and press the softkey **2ND**. . .	This will change the soft key to **1ST**, ready to weigh the first truck of the next car.

Scale should be used in the same direction as it was calibrated

Communications

Printer output is on COM1: 9600, N, 8, 1
Remote display output of total car weight is on COM2: 9600, N, 8, 1

On the 1310, COM3 and COM4 are not used.

Printout from the dual draft mode (mode 1)

```
DUAL DRAFT
12-30-03   14:20:48
ID  :            1455

TRUCK 1
GROSS:   138800  lb
TARE :        0  lb
NET  :   138800  lb


TRUCK 2
GROSS:   151800  lb
TARE :        0  lb
NET  :   151800  lb


TOTAL CAR
GROSS:   290600  lb
TARE:         0  lb
NET:     290600  lb
```

Printout from the single draft mode (mode 2)

```
SINGLE DRAFT
12-30-03   14:24:14
ID:          123695

TRUCK 1
GROSS:   200100  lb
TARE:         0  lb
NET:     200100  lb


TRUCK 2
GROSS:    28500  lb
TARE:         0  lb
NET:      28500  lb


TOTAL CAR
GROSS:   228600  lb
TARE:         0  lb
NET:     228600  lb
```

Appendix 1: Weighline WI-130 Calibration

Single and Two Scale Static Systems

During the calibration process the car must be moved across the scale in the direction the scale will normally be used.

Indicators used with static Weighline systems are shipped with Weighline software installed. If software is changed then this software must be included.

For calibration you need one loaded railroad car with known truck weights. For two scale systems the car truck centers should be the same as will normally be used.

Each scale has it's own analog input channel and has effectively two span calibration values, one for the first truck and one for the second truck. (The second truck calibration value is the first truck calibration factor multiplied by a correction factor.) This is to optimize the performance of the system for two draft weighing.

Care should be taken to ensure that the car truck weights do not get reversed. Refer to Appendix 3 for how to proceed when truck weights are not known, or if it is not clear which truck weight belongs to which end of the car, or only a known net weight is available.

Step by Step Calibration Procedure

1. Enter calibration mode by pressing and holding the **ESCAPE** key until a beep is heard.

2. Key in password (30456) at the ***SET UP PASSWORD*** prompt, then press the **ENTER** key. . . Display shows ***CAL SCALE # 1***.

3. Press **ENTER**. . . Display shows ***CALIBRATE*** with the following soft keys:

4. Press **ZERO**. . . Display shows ***ZERO CALIBRATION REMOVE LOAD, PRESS ENTER***

5. Make sure scales are clear and then press **ENTER**. . . Display shows ***DETERMINING ZERO*** then ***...DONE*** when complete. Then ***(OK) ANY KEY TO CONTINUE***.

6. Press any key.

7. Press **SPAN**. . . Display shows ***CALIBRATE CAL WT (LB):***

8. Enter weight of first truck. Press **ENTER**. . .	Display shows ***SPAN CALIBRATION APPLY LOAD, PRESS ENTER***
9. Move first truck onto the first group of 4 Weighline scale rails making sure that the wheels are in the center of the Weighline sections.	
10. Press **ENTER**. . .	Display shows ***DETERMINING SPAN.....DONE (OK) ANY KEY TO CONTINUE***
11. Press any key.	
12. Press **EXIT**. . .	Display shows ***SAVE CHANGES? YES***
13. Press **YES**. . .	Display Flashes ***WEIGH-TRONIX*** and then shows ***CAL WT SCL1?*** (weight entered for first truck)
14. Enter second truck weight. Press **ENTER**. . .	Display Shows ***PLACE CALIBRATION WEIGHT OF*** **"entered weight" ON SCALE 1 FOR** ***CALCULATION OF THE CORRECTION FACTOR AND PRESS ANY KEY.***
15. Move the car so that the second truck is on the first group of 4 Weighline scale rails, making sure that the wheels are in the center of the Weighline sections. Press any key. . .	Scale now reverts to normal operation mode.

This completes the calibration for single scale systems. If you have a two scale system, continue following these steps:

1. On two scale systems re-enter calibration mode again by pressing and holding the **ESCAPE** key until a beep is heard.	
2. Key in password (30456) at the ***SET UP PASSWORD*** prompt, then press the **ENTER** key. . .	Display shows ***CAL SCALE # 1***.

3. Press the number 2 on the keypad then press the **ENTER** key.

4. Press **ENTER**. . .

Display shows ***CALIBRATE*** and the following soft keys are displayed:

5. Press **ZERO**. . .

Display shows
ZERO CALIBRATION
REMOVE LOAD, PRESS ENTER

6. Make sure scales are clear and then press **ENTER**. . .

Display shows
DETERMINING ZERO ...DONE
(when complete)
(OK)PRESS ANY KEY TO CONTINUE

7. Press any key.

8. Press **SPAN**. . .

Display shows
CALIBRATE
CAL WT (LB):

9. Enter weight of first truck. Press **ENTER**. . .

Display shows
SPAN CALIBRATION
APPLY LOAD, PRESS ENTER

10. Move car so that the first truck is on the second group of four Weighlines, making sure that the wheels are in the center of the Weighline sections.

11. Press **ENTER**. . .

Display shows
DETERMINING SPAN.....DONE
(OK) ANY KEY TO CONTINUE.

12. Press any key.

13. Press **EXIT**. . .

Display shows
SAVE CHANGES? YES

14. Press **YES**. . .	Display flashes ***WEIGH-TRONIX*** and then shows ***CAL WT SCL2?*** (weight entered for first truck)
15. Enter second truck weight. Press **ENTER**. . .	Display Shows ***PLACE CALIBRATION WEIGHT OF "entered weight" ON SCALE 2 FOR CALCULATION OF THE CORRECTION FACTOR AND PRESS ANY KEY.***
16. Move the car so that the second truck is on the second group of four Weighlines, making sure that the wheels are in the center of the Weighline sections.	
17. Press any key. . .	Scale now reverts to normal operation mode.

This completes the calibration for the two scale system.

Appendix 2: Weighline WPI-135 & Model 1310 Calibration

Single and Two Scale Static Systems

During the calibration process the car must be moved across the scale in the direction the scale will normally be used.

Indicators used with static Weighline systems are shipped with Weighline software installed. If software is changed then this software must be included.

For calibration you need one loaded railroad car with known truck weights. For two scale systems the car truck centers should be the same as will normally be used.

Each scale has it's own analog input channel and has effectively two span calibration values, one for the first truck and one for the second truck. (The second truck calibration value is the first truck calibration factor multiplied by a correction factor.) This is to optimize the performance of the system for two draft weighing.

Care should be taken to ensure that the car truck weights do not get reversed. Refer to Appendix 3 for how to proceed when truck weights are not known, or if it is not clear which truck weight belongs to which end of the car, or only a known net weight is available.

Step by Step Calibration Procedure

1. Enter calibration mode by pressing and holding the **ESCAPE** key until a beep is heard.

2. Key in password (30456) at the ***SET UP PASSWORD*** prompt, then press the **ENTER** key. . .

   Display shows ***CALIBRATE*** with the following soft keys:

SETUP	CAL	INFO	SCL#	EXIT

3. Press **CAL**. . .

   Display shows ***CALIBRATE—CAL*** with the following soft keys:

ZERO	SPAN	SPEC		

4. Press **ZERO**. . .

   Display shows
   ZERO CALIBRATION
   REMOVE LOAD, PRESS ENTER

5. Make sure scales are clear and then press **ENTER**. . .

   Display shows
   DETERMINING ZERO then ***...DONE*** when complete. Then ***(OK) ANY KEY TO CONTINUE***.

6. Press any key.

7. Press **SPAN**. . .

   Display shows
   CALIBRATE
   CAL WT (LB):

8. Enter weight of first truck. Press **ENTER**. . .

   Display shows
   SPAN CALIBRATION
   APPLY LOAD, PRESS ENTER

9. Move first truck onto the first group of 4 Weighline scale rails making sure that the wheels are in the center of the Weighline sections.

10. Press **ENTER**. . .

    Display shows
    DETERMINING SPAN.....DONE
    (OK) ANY KEY TO CONTINUE

11. Press any key, then press **ESCAPE**..

12. Press **EXIT**. . .

    Display shows
    SAVE CHANGES? YES

13. Press **YES**. . .

    Display Flashes ***WEIGH-TRONIX*** and then shows
    CAL WT SCL1? (weight entered for first truck)

14. Enter second truck weight. Press **ENTER**. . .

    Display Shows
    PLACE CALIBRATION WEIGHT OF
    "entered weight" ON SCALE 1 FOR *CALCULATION OF THE CORRECTION FACTOR AND PRESS ANY KEY.*

15. Move the car so that the second truck is on the first group of 4 Weighline scale rails, making sure that the wheels are in the center of the Weighline sections. Press any key. . .

    Scale now reverts to normal operation mode.

This completes the calibration for single scale systems. If you have a two scale system, continue following these steps:

1. On two scale systems re-enter calibration mode again by pressing and holding the **ESCAPE** key until a beep is heard.

2. Key in password (30456) at the ***SET UP PASSWORD*** prompt, then press the **ENTER** key. . .

   Display shows the following keys:

SETUP **CAL** **INFO** **SCL#** **EXIT**

3. Press **SCL#** and key in the number 2 on the keypad then press the **ENTER** key. . .

   Display shows ***CALIBRATE*** and the following soft keys are displayed:

4. Press **CAL**. . .

   Display shows ***CALIBRATE—CAL*** and the following keys:

5. Press **ZERO**. . .

   Display shows
   ZERO CALIBRATION
   REMOVE LOAD, PRESS ENTER

6. Make sure scales are clear and then press **ENTER**. . .

   Display shows
   DETERMINING ZERO ...DONE
   (when complete)
   (OK)PRESS ANY KEY TO CONTINUE

7. Press any key. . .

   Display shows ***CALIBRATE—CAL*** and the following keys:

8. Press **SPAN**. . .

   Display shows
   CALIBRATE
   CAL WT (LB):

9. Enter weight of first truck. Press **ENTER**. . .

   Display shows
   SPAN CALIBRATION
   APPLY LOAD, PRESS ENTER

10. Move car so that the first truck is on the second group of four Weighlines, making sure that the wheels are in the center of the Weighline sections.

11. Press **ENTER**. . .

    Display shows
    DETERMINING SPAN.....DONE
    (OK) ANY KEY TO CONTINUE.

12. Press any key, then press **ESCAPE**.

13. Press **EXIT**. . .

    Display shows
    SAVE CHANGES? YES

14. Press **YES**. . .	Display flashes ***WEIGH-TRONIX*** and then shows ***CAL WT SCL2?*** (weight entered for first truck)
15. Enter second truck weight. Press **ENTER**. . .	Display Shows ***PLACE CALIBRATION WEIGHT OF "entered weight" ON SCALE 2 FOR CALCULATION OF THE CORRECTION FACTOR AND PRESS ANY KEY.***
16. Move the car so that the second truck is on the second group of four Weighlines, making sure that the wheels are in the center of the Weighline sections.	
17. Press any key. . .	Scale now reverts to normal operation mode.

This completes the calibration for the two scale system.

Appendix 3

Calibrating Weighline Static Scales when known car weight is not available

When car truck weights are not known, the first step in calibration should be to set span calibration values of scale 1 to be the same.

Initial Setting of Scale Span Calibration Values

1. Estimate weight of the first truck of the car to be used. This truck weight will be used exclusively.

2. Follow steps 1 through 4 of the calibration procedure.

3. For step 5 use the default estimated first truck weight rather than the second truck weight and **do not move** the car - leave the first truck on the scale.

The initial calibration values for scale 1 will now be set.

Total Car Gross Weight is Known

1. Check that soft key displays are as follows and weight display is ***0***:

DOUBL	1ST	SETUP	ID	SCL1

2. Place the first truck on the scale. . . — Truck weight is displayed

3. Record weight - wt1.

4. Place second truck on scale. . . — Second truck weight is displayed -

5. Record weight- wt2.

6. Calculate actual truck weights as follows:-
   WT1= Known Gross Weight x {wt1/(wt1+wt2)}
   WT2= Known Gross Weight x {wt2/(wt1+wt2)}

7. Use the truck weights WT1 and WT2 to calibrate the system using the standard procedure.

Net Weight is Known

The painted tare weight of a car is used to do a rough calibration, a known net weight is loaded into the car and from this known net weight the gross weight of each truck is calculated. This method is unlikely to be as accurate as having known truck weights

On a full draft two scale system just one of the WEIGHLINE scales is used to determine the gross weight of each truck.

IMPORTANT - to minimize procedure errors, ensure that the wheels are positioned in the center of the colored band for each and every calibration weighment.

1. Configure the indicator so that soft key display shows the following:

2. Place the first truck of the empty car on the scale. . . Truck weight is displayed

3. Record weight - tw1.

4. Place second truck of the empty car on scale Second truck weight is displayed

5. Record weight- tw2.

6. Calculate approximate truck weights as follows:-
   TW1= Painted Tare Weight x {tw1/(tw1+tw2)}
   TW2= Painted Tare Weight x {tw2/(tw1+tw2)}

7. Use the truck weights TW1 and TW2 to calibrate the system using the standard procedure.

8. Load a known net weight into the car. Ideally this should be about 200,000 lbs. Let this known net weight be:- $NW.

9. Weigh truck #1 on scale 1.
   Weigh truck #2 on scale 1. Let these truck weights be:- FW1 and FW2.

10. Calculate the approximate truck net weights, NW1 and NW2 from:
    NW1 = (FW1-TW1)
    NW2 = (FW2-TW2)

11. Calculate the true net weights, $NW1 and $NW2 from:-
    $NW1 = NW1/(NW1+NW2) * $NW
    $NW2 = NW2/(NW1+NW2) * $NW

Co-Factor or Correction Factor is entered under the SETUP soft key menu.

Default = 1 for both scale 1 and scale 2.

12. Calculate the correction factor to be applied to the approximate tare weights, CF1 from:
    CF1 = $NW1/NW1

13. Calculate the true tare weights, $TW1 and $TW2 from:
    $TW1 = CF1 * TW1
    and
    $TW1 = CF1 * TW2

14. Calculate the true gross truck weights, $GW1 and $GW2 from:
    $GW1 = $TW1 + $NW1
    and
    $GW2 = $TW2 + $NW2

15. Recalibrate the system following the calibration procedure using $GW1 and $GW2 as the truck weights.

Checking that Car Truck Weights are Correctly Assigned

When car truck weights have been obtained on another scale they sometimes get misassigned i.e. recorded truck weights are not associated with the appropriate car truck. This can cause very confusing results and create the impression that the indicator is not accepting the truck weights correctly during calibration.

The following procedure provides a means of checking that the truck weights are correctly assigned.

1. Configure the indicator so that these soft keys are displayed:

2. Place the first truck on the scale. . . Truck weight is displayed

3. Record weight - wt1.

4. Place second truck on scale. . . Second truck weight is displayed

5. Record weight- wt2.

6. Compare wt1 with the known truck weight for that truck and wt2 with the known truck weight of that truck.

7. The heaviest actual truck weight should be the heaviest weight recorded.

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