Mechanical Truck Scale
Models 8130 & 8140
Amendment Record

MECHANICAL TRUCK SCALE
MODELS 8130 AND 8140
SERVICE MANUAL
Document 50726

Manufactured by Thurman Scale
4025 Lakeview Crossing
Groveport, Ohio 43215

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Maintenance > Introduction

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Section 1: General Information

1.1. PRODUCT DESCRIPTION

The Model 8130 and 8140 S.A.M. (Side Arm Mechanical) is a uniquely designed truck scale, combining the reliability of a mechanical lever system with an above grade low profile design.

- The main levers load a connecting backbone pipe which runs parallel to the length of the weighbridge allowing for a shallow approach, pit-less installation.
- The low profile foundation design offers many benefits over the traditional scale pit design including reduced construction costs and simplified maintenance.
- With the scale installed completely above ground, the lever system, suspension components and weighbridge are not subject to the harsh corrosive environment found in a scale pit.
- The weighbridge consists of factory assembled modules.
  - Each module connects to the adjoining sections with a step hinge.
  - These step hinges are manufactured using fixtures, assuring fit and eliminating the need for on-site fit-up and field welding.
- Model 8130 has a field pour concrete deck.
- Model 8140 has a pit-less above-ground steel deck, allowing the scale to be operational within a few hours after the scale is delivered to the site.
- A single load cell with digital indication may be used with the Model 8130 and 8140.
1.1. PRODUCT DESCRIPTION, CONTINUED

1.1.1. STANDARD SIZES

- Available in 25', 30', 50', 60', 70', 80' and 90' standard lengths.
- 10', 11', and 12” standard widths.

1.1.2. CAPACITIES

Gross capacities ranging from 40 to 135 tons, with corresponding CLC capacity of 60K lbs. to 120K lbs., are available as standard.

- The sizes and capacities listed are considered standard. Special size and capacities are available to meet individual application requirements.
- Please refer to the data tag located on the weighbridge to determine the capacity of the scale to be installed.

1.1.3. ACCURACY

Designed to meet or exceed National Institute of Standards, Handbook H-44 requirements for Class III L Devices.
Section 2: Scale Installation

2.1. FOUNDATION PREP & CONSTRUCTION

1. Select a site which allows easy access to and from the scale, ensuring enough area for straight and level approaches.
   - The site should have good drainage. Surrounding areas must not drain into or through the scale site.
   - The soil must have a minimum bearing pressure of 3000 psf, or as specified on the foundation drawings supplied by Thurman Scale for the scale to be installed.

2. Obtain all necessary permits and licenses prior to beginning construction.

**NOTE:** Always check with public utilities to make sure an underground utility is not going to be uprooted during excavation.

3. Using a transit, sight in and mark with stakes the area where the concrete forms are to be built.
4. Construct forms making sure they are built square, plump and level.
5. Load and compact gravel into the base of the forms if necessary.
6. Cut and position rebar into the forms as per the schedule detailed on the foundation prints supplied by Thurman Scale for the scale being installed.
7. Anchor the foundation with one of the following.
   a. J-bolts or,
   b. (Recommended) Expansion anchors, which are drilled into the concrete after it has fully cured.
      - These are supplied with the scale.

**NOTE:** Thurman Scale recommends using Phillips Drill (Red Heads) # WS 3484 Expansion Anchors, recommended because of the flexibility allowed in final positioning of the scale.
When J-bolts are being used, insert the anchor bolts into their proper positions within the forms, measuring out from the center line of the scale foundation.
2.1. FOUNDATION PREP & CONSTRUCTION, CONTINUED

8. Pour the concrete, using a mix to yield a minimum 4000 psi, or as specified on the foundation drawing.

9. Vibrate the concrete into position to assure consistency.
   - All concrete work should conform to standards of the American Concrete Institute Code.

10. Before allowing traffic on the scale, allow the concrete to cure for 28 days or until it has reached design strength, as defined by the foundation drawing provided by Thurman Scale.

11. Remove all the forms and backfill for proper drainage.
   - A slope away from the scale is recommended.

2.2. INSTALLING THE MAIN LEVERS

1. Using a chalk line, mark the foundation to determine the center line of the foundation.

2. With a tape measure, check and install the Expansion Anchors.

3. Place the Main Lever Corner Stands in position.
   - Use shims under the corner stands to set elevation.
   - Install the clamp plates and nuts on to the anchor bolts.
   - Do not tighten yet.

4. Using high quality lithium-based grease, lubricate and install a Rocker into each Corner Stand.

5. Install the Main Lever Lower "V" Bearing into the Rockers.
2.2. INSTALLING THE MAIN LEVERS, CONTINUED

6. Place the **Main Levers** into position on top of the **Corner Stands**.

7. Block the **Torque Arms** of each **Main Lever** into a level position.
   - Check that the **Torque Arms** are lined up with each other by sighting down the edge of the torque arms.
   - Adjust the **Corner Stands**, if necessary, to bring the **Torque Arms** into alignment.

8. Set the **Ball Blocks** onto the **Load Pivots** of the main levers.

9. Tilt the **Ball Blocks** so that they lean towards the center of the scale.

10. Lightly grease the **Ball Bearings** and place them into position on the **Ball Blocks**.
2.3. INSTALLING THE WEIGHBRIDGE MODULES

The weighbridge is shipped in one or more connecting modules depending on the total length of the scale.

THREE MODULE TYPES

The three different module configurations are the Base, Intermediate and the End.

- The Base Module has provisions for two main levers.
- The Intermediate Module has connecting hinge plates on both ends of the module and has provisions for one lever.
- The End Module contains hinge plates on only one end and provisions for one main lever.

Place the Base Module into position first, followed by an Intermediate Module(s), then the End Module.

<table>
<thead>
<tr>
<th>LENGTH</th>
<th>MODULE NUMBER</th>
<th>TYPE OF MODULES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 30'</td>
<td>1</td>
<td>(1) Base</td>
</tr>
<tr>
<td>35' to 60'</td>
<td>2</td>
<td>(1) Base, (1) End</td>
</tr>
<tr>
<td>65' to 90'</td>
<td>3</td>
<td>(1) Base, (1) Intermediate, (1) End</td>
</tr>
<tr>
<td>95' to 120'</td>
<td>4</td>
<td>(1) Base, (2) Intermediate, (1) End</td>
</tr>
</tbody>
</table>

CAUTION

Scale weighbridge modules are **enormously heavy and awkward**. Exercise extreme care when lifting the modules to avoid personal bodily harm or damage to the equipment.
2.3. INSTALLING THE WEIGHBRIDGE MODULES, CONTINUED

1. Using a crane of sufficient size, install the Base Module over the Main Levers.
   □ There is one left-hand, and one right-hand lever.

   **CAUTION**

   When lifting the scale modules, ensure that the lifting chains are equally loaded, secure, and that an angle greater than thirty degrees (30°) is maintained.

2. Carefully lower the Base Module onto the Ball Suspension Assemblies.

3. Check the gap between the end of the module and the approach wall.
   □ This dimension should be equal to half of the difference between the overall foundation dimension and the scale length.
   □ If the measured dimension does not equal the calculated dimension, move the main lever corner stands with a sledge hammer until the gap measurement is correct.

**A WORKING EXAMPLE**

The overall foundation length was measured at 70’ 2”. The scale length is 70’. The difference between the two dimensions equals two inches (2”), therefore the gap between the end of the scale and the approach wall should equal one inch (1”) on each end.

4. Remove the lifting chains and attach to the next Module and lower it into place.

5. Align the module with the connecting step hinges of the proceeding module and the ball blocks of the main lever.
2.3. INSTALLING THE WEIGHBRIDGE MODULES, CONTINUED

6. While the crane is still attached to the module, insert a bolt into the connection holes.

7. Install the lock washer and nut onto the bolts, tightening them until snug.

8. Continue lowering the module so that it rests on the ball block assemblies.

9. Repeat steps 4-8 until the last module has been placed.

10. Tighten all the Connection Bolts to a minimum of 125 ft./lbs., up to a maximum of 175 ft./lbs.

2.4. INSTALLING THE BACKBONE PIPE AND LEVERS

1. Assemble the Backbone Pipe by bolting the Splice Plate End of one section of the pipe to a Connection Box End of the adjoining section of pipe.

   The adjoining sections of the backbone pipe are match marked for easy identification.

2. Insert a bolt in each connection of the four corner holes of the Splice Plate.

3. Install a lock washer and nut onto each of the bolts.

4. Using a hammer, drive a dowel pin into each of the center holes of the splice plates.

5. Tighten the nut to a minimum of 125 ft./lb.

6. Assemble the Transverse Lever to the Backbone Pipe Connection Box containing four holes on the outside end of the box.

7. Place the Backbone Fulcrum Stands into position.

8. Grease and install the Fulcrum Stand Rocker.

9. Install the Fulcrum “V” bearings into the rockers.

10. Place the Backbone Pipe on the Fulcrum Stands.

11. Block the end of the Transverse Lever in a level position.
2.4. INSTALLING THE BACKBONE PIPE AND LEVERS, CONTINUED

12. Install the **Shackle Assemblies** between the **Backbone Connection Boxes** and the **Nose Iron** of each of the **Main Levers**.

13. Remove the **blocking** from the **Torque Arms** of the **Main Levers**.
   - The **Top Bearing** of the **Shackle Assembly** should be centered on the **Load Pivot** of the Backbone Pipe.
   - The **Main Lever Pivot** should rest in the center of the **Lower Shackle Bearing**.

14. Plumb the **Shackle Assemblies** by moving the **Backbone Pipe Fulcrum Stands** and **Main Lever Corner Stands** with a sledge hammer, if necessary.

15. Center the **Pivot** in the **Fulcrum Stand "V" Bearings**.
   - Be certain they do not interfere with the **Anti-friction Buttons**.

16. Tighten all the **anchor bolts** of the **Main Lever Corner Stands** and the **Backbone Pipe Fulcrum Stands**.

17. With the **Transverse Lever** level, place a level on the **Torque Arm** of each lever.

18. Raise or lower the **Bottom Bearing** of the **Shackle Assembly** to bring the **Main Lever** into a level position.
   - Ensure that the distance between the **Top** and **Lower Bearings** of the **Shackle Assembly** is equal on both sides of the assembly.

**NOTE:** *Leave an easy access to the Nose Irons. This allows for future calibration.*
2.5. BALL BLOCK ALIGNMENT

1. Check each corner to ensure that the Ball Blocks and Ball Plates are aligned.

2. Rock the Weighbridge end-to-end, observing the motion of the ball blocks.

If the Ball Blocks and Ball Plates are properly aligned, the Balls will move in the cups of the Ball Blocks.

☐ The Ball Block will not pivot.

If the Ball Block pivots, follow these steps.

3. Loosen the bolts holding the Upper Ball Plate.

4. Adjust the position of the Upper Ball Plate until the excessive pivoting of the Ball Blocks is eliminated.

☐ Extreme cases may require the corner stands to be repositioned.

5. Ensure that the Shackle Assembly is plumb, and that all other components are realigned prior to calibration.
2.6. INSTALLING THE LOAD CELL PILLARS

The Model 8130 and 8140 Scales are electro-mechanical, using a load cell connected to the transverse lever.

1. Position the Load Cell Pillar in its approximate position.

2. Center the hole in the Top Bracket of the Pillar over the Pivot Loop of the Transverse Lever.

3. Assemble the Load Cell Suspension Hardware and connect to the S-Type Load Cell.

4. Install the Load Cell Assembly between the Transverse Lever and the Load Cell Pillar.

5. Position the Links so that they are perpendicular to the Loops.

6. Plumb the Load Cell Assembly by moving the position of the Load Cell Pillar.

7. Secure the Pillar into position by using the Expansion Anchors supplied in the Mounting Hardware Kit.

8. Remove the Blocking from the Transverse Lever.

9. Place a Level on the Transverse Lever.

10. Adjust the height of the Load Cell Assembly by turning the Adjustment Nuts until the Transverse Lever is level.

11. Lock the Adjustment Nuts in place.
Section 3: Calibration

The Main Levers of the Model 8130 and 8140 have been individually tested and factory sealed for corner accuracy, therefore only minor section, zero and span adjustments will be necessary during the final calibrations.

3.1. INITIAL ZERO AND SPAN ADJUSTMENTS

1. Seat the Suspension Components.
2. Drive the test truck across the scale, stopping hard momentarily several times across the scale.
3. Repeat this procedure at least three (3) times to assure that all parts are properly seated.
4. The Zero and Span of the scale should be roughly adjusted to check for repeatability and return to zero.
   □ At the first, they do not need to be set perfectly.
   □ Final zero and span adjustments will be performed after all the sections have been fully adjusted.
5. Adjust the coarse Span of the indicating device.

3.2. REPEATABILITY AND RETURN TO ZERO PERFORMANCE TEST

1. Position the test truck in the center of the weighbridge.
2. Note the weight reading.
3. Pull the truck off the scale and note the return of zero.
4. Repeat this procedure at least three (3) times to assure consistency.
5. If the scale does not repeat the readings, within tolerance, check for mechanical obstructions, or "touches".
6. Also be certain that the scale is assembled properly, and that the lever system is aligned correctly.
3.3. **SECTION TEST AND ADJUSTMENT**

1. The section test should be conducted centering the test load over each section.
   (i.e., weight cart, block weights, or rear axles of the truck)

2. *Write down* the **weight indication** of each section.

   - The sections should be adjusted so that the weight indications of all sections match within the tolerances set forth by the NIST Handbook H-44.

3. Adjust a section by moving the **Nose Iron** of the **Main Lever** directly supporting the section requiring adjustment.

   **Note:** *Moving the nose iron away from the corner stand of the lever will reduce the weight reading of the section. Conversely, moving the nose iron towards the corner stand will increase the weight reading.*

4. Always plumb the connecting **Shackle Assembly** after the **Nose Iron** has been moved.

5. Repeat steps 2-4 until the weight readings of the sections match within tolerance.
3.4. DIGITAL INDICATOR AND SPAN CALIBRATION

1. The Model 8130 and 8140 may be operated as an electro-mechanical scale with a stand-alone digital indicator by connecting the Transverse Lever to a load cell.

**IMPORTANT NOTE**: Any time the Nose Iron of the Transverse Lever has been moved, the Digital Indicator needs recalibration.

2. Perform the final span adjustments, following the digital indicator technical manual as a guideline.
Section 4: Maintenance

Installing a scale known for its structural integrity is the first step to ensuring dependable performance, but even a quality scale must be properly maintained. Preventative maintenance is the most important factor in extending the life of your new truck scale. Depending on traffic volume and environmental factors your scale may require more frequent maintenance. At minimum you should perform a thorough maintenance inspection every six months. It is recommended that you discuss a recommended maintenance plan with your servicing distributor familiar with your particular application.

A properly maintained truck scale will give many years of accurate and reliable service. Periodic maintenance is recommended to keep the scale in top condition.

Maintenance is generally performed by a regular maintenance program that includes: inspections, testing for accuracy with certified test weights, yearly cleaning, close inspection, and greasing. All this work should be performed by an experienced and well-equipped scale service provider like Fairbanks Scales.

Care should always be exercised when driving loads onto the scale, as well as, removing loads from the scale. Trucks should always have a straight approach to the scale, and a straight departure from the scale. Trucks should never perform a turn when any wheels are supported by the scale. Slowly applying loads with slow, steady speeds and the gentle application of brakes will ensure long life and satisfactory performance. Fifth wheel and tandems should NEVER be shifted while on the scale. And the scale understructure should be kept as dry as possible to prolong the life of the steel supporting structure.

4.1. VISUAL INSPECTION

Begin by examining the foundation and approaches for any major structural or surface problems. Cracks that lead to movement or settling will cause chronic calibration errors. Should any deterioration exist, immediate repairs are recommended. Additionally, make sure the foundation is dry and properly drains. Perpetually wet soil conditions can eventually lead to undesired settling of the foundation.

Next, check the deck for rust or crumbling concrete that can weaken the scale’s structure. Clean and paint rusted steel, and repair or replace concrete as needed to maintain the scale’s structural integrity.

Using a crowbar, check the weighbridge for free movement both with and without a vehicle on the scale. If binding seems to be an issue, check both ends of the deck for clearance. Clean all debris between the end wall and the deck.
4.2. CLEANING

All moving parts need to be kept free and clear of any debris that may inhibit movement or accelerate wear. All pivot and bearing locations should be inspected for accumulation of debris. Clean all parts as required.

Check under the weighbridge for accumulation of mud or other debris that will trap moisture on the steel structure. All steel surfaces should be washed down to prevent corrosion.

4.3. LUBRICATION

After all the components are properly cleaned, generously lubricate all moving contact points with lithium-based heavy bearing grease. Fully enclose the working parts within a protective shell. See key lubrication points above:
4.4. REPLACE WEAR PARTS

The pivots and bearings supplied with this scale are made from hardened, aircraft grade, high strength alloy steel. However, after much use the pivots and bearings will eventually develop some wear. In order to keep your scale weighing accurately, you should replace pivots, bearings, and other moving parts. We recommend the complete overhaul kit every 200,000 weighments. This kit includes all pivots and bearings as well as suspension components.

(Replacement schedule will vary from scale to scale. Many factors including load patterns, cleanliness, weather, and lubricant will affect actual lifecycle of these parts.)

4.5. CALIBRATION

No maintenance program is complete without calibration. Any time you perform these maintenance procedures, you should check the calibration of your scale. Give your scale proven accuracy by performing a complete section calibration. See Section 3 for more calibration details.
## Section 5: Parts

### 5.1. PARTS LIST

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<thead>
<tr>
<th>Item#</th>
<th>Part#</th>
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</table>

* Connects to ITEM 3 and 4.

** The Backbone and Main Levers each have numerous model sizes. Please contact Solutions to order the needed part(s).
5.2. PARTS DIAGRAMS
# 5.3. CORNER & FULCRUM STAND PARTS LIST

## Corner & Fulcrum Stand Parts List

<table>
<thead>
<tr>
<th>Item#</th>
<th>Part#</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>64827</td>
<td>CORNER STAND, 15&quot;x8&quot;x5.25&quot;</td>
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<tr>
<td></td>
<td>64966</td>
<td>CORNER STAND, 20&quot;x10&quot;x7.5&quot;</td>
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<tr>
<td>2</td>
<td>65280</td>
<td>ROCKERS, 3.25&quot;</td>
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<td></td>
<td>65856</td>
<td>ROCKERS, 6&quot;</td>
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<tr>
<td>3</td>
<td>65282</td>
<td>V-BEARING, LOWER, 5.63&quot;</td>
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<tr>
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<td>65624</td>
<td>V-BEARING, LOWER, 7.63&quot;</td>
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## Backbone Pipe Fulcrum Stand

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</thead>
<tbody>
<tr>
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<td>65860</td>
<td>FULCRUM STAND, 17&quot; PIVOT LINE</td>
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<td></td>
<td>65860</td>
<td>FULCRUM STAND, 21&quot; PIVOT LINE</td>
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<td>5</td>
<td>65858</td>
<td>CORNER STAND, BACKBONE</td>
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<td>6</td>
<td>65280</td>
<td>ROCKERS, 3.25&quot;</td>
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<td>7</td>
<td>65903</td>
<td>LOWER V-BEARING, 3.63&quot;</td>
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<td>64957</td>
<td>FULCRUM STAND ASSY, 21&quot; PIVOT LINE</td>
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5.4. CORNER & FULCRUM STAND PARTS DIAGRAM
### 5.5. CONNECTION BOX PARTS LIST

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<th>Part#</th>
<th>Description</th>
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<td>CONNECTION BOX for TRANSVERSE LEVER, 6”</td>
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<td>65863</td>
<td>CONNECTION BOX for TRANSVERSE LEVER, 6”</td>
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<tr>
<td></td>
<td>83331</td>
<td>CONNECTION BOX, 6”</td>
</tr>
<tr>
<td>2</td>
<td>64824</td>
<td>DOWEL PIN, 1”X2”</td>
</tr>
<tr>
<td></td>
<td>66353</td>
<td>DOWEL PIN, 5/8”X 1”</td>
</tr>
<tr>
<td>3</td>
<td>65628</td>
<td>PIVOT KE, 1”X ½”X 3 ¾”</td>
</tr>
<tr>
<td></td>
<td>65610</td>
<td>Pivot KE, 1”X ½”X 7 ¼”</td>
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</tbody>
</table>

### 5.6. CONNECTION BOX PARTS DIAGRAM

![Connection Box Parts Diagram](image)
### 5.7. LOAD CELL ASSEMBLY PARTS LIST

<table>
<thead>
<tr>
<th>Item#</th>
<th>Part#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>65877</td>
<td>65877 NOSE IRON, 8&quot;X 4 ½&quot;X1&quot;</td>
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<tr>
<td>2</td>
<td>65879</td>
<td>65879 SQUARE PIVOT, ¾&quot;X ¾&quot;X2 ¾&quot;</td>
</tr>
<tr>
<td>3</td>
<td>66537</td>
<td>66537 LOOP, 2 ½” SPREAD</td>
</tr>
<tr>
<td>4</td>
<td>66657</td>
<td>66657 INSTALLATION KIT</td>
</tr>
<tr>
<td>5</td>
<td>11646</td>
<td>– LOAD CELL, 1K</td>
</tr>
<tr>
<td>5</td>
<td>95961</td>
<td>– LOAD CELL, 1.5K</td>
</tr>
<tr>
<td>6</td>
<td>66187</td>
<td>66187 LOAD CELL PILLAR</td>
</tr>
</tbody>
</table>

### 5.8. LOAD CELL ASSEMBLY PARTS DIAGRAM

![Diagram of load cell assembly parts]
Appendix I: Photos from a Completed Site

The assembled Weighbridge

Corner Stand Assembly

Load Cell Assembly

Adjusting the Nose Iron