Farm Scale Installation Guide

CENTRAL CITY SCALE INCORPORATED

Thank you for choosing Avery Weigh-Tronix as your source for quality farm scale components. With proper installation and care your Avery Weigh-Tronix scale will provide many years of accurate and dependable weighing. Please read the following instructions before proceeding with the installation of your scale.

Unpacking

Please handle all Weigh Bars carefully so that their cables are not cut, pinched, or pulled loose. Damage to a Weigh Bar cable cannot easily be repaired and may require replacement of the entire assembly. **DO NOT LIFT WEIGH BARS BY THE CABLE.**

Unpack the system components and inspect them for shipping damage. If damage is present, a written inspection request must be filed with the carrier within 15 days of delivery.

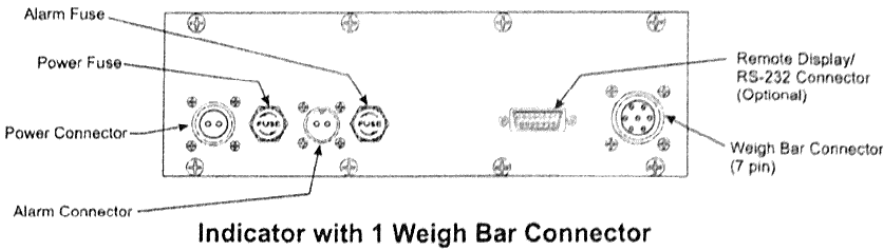
Descriptions

Weigh Bars

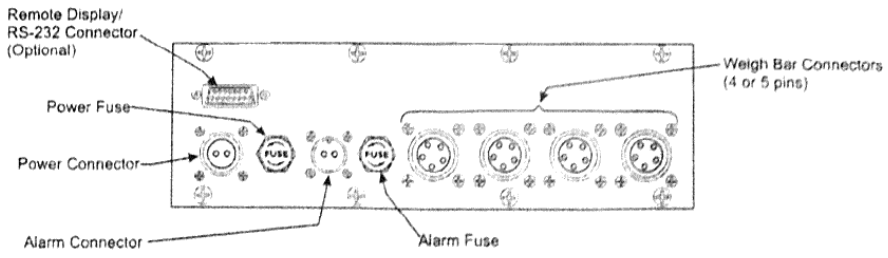
The Avery Weigh-Tronix Weigh Bar has no moving parts and is effectively sealed to protect it from the elements. As weight is applied to the scale, each Weigh Bar bends slightly and a corresponding electronic signal is converted to a weight reading by the scale indicator. The Weigh Bar cables can be connected directly to the indicator or through a junction box and separate interface cable.

Indicators

Indicators are manufactured with up to four 5-pin Weigh Bar connectors or a single 7-pin connector for junction box interface cable.



Indicator with 1 Weigh Bar Connector



Indicator with 4 Weigh Bar Connectors

Farm Scale Systems

There are two basic types of farm scale systems, the 3-point system and the 4-point system.

3-Point System

The 3-point system is usually employed for two-wheeled towed machinery, such as portable grinder/mixers, mixer wagons and weigh wagons. The 3-point system consists of two axle Weigh Bars and one hitch-mounted Weigh Bar. The three Weigh Bars support the entire weight of the implement.

Many 3-point systems will have an indicator with only 3-Weigh Bar connectors. A second option is an indicator with 4-Weigh Bar connectors. If this option is used it will be necessary to use an adapter plug (dummy plug). For indicators with 4-pin connectors the adapter plug is Avery Weigh-Tronix P/N 11891-0017. For indicators with 5-pin connectors the adapter plug is Avery Weigh-Tronix P/N 21575-0027. The adapter plug must be connected to the one unused Weigh Bar connector on the indicator.

4-Point System

The 4-point system is normally used for storage tank scales, platform scales, truck-mounted scales, and scales built into equipment with four wheels. The 4-point system uses four Weigh Bars (one under each corner) to support the entire weight of a storage tank, platform, etc.

General Installation Notes

Warning

Do not weld on or near a Weigh Bar. Excessive heat or high currents may cause internal damage.
Follow all safety rules for the equipment on which the scale is being installed and for the tools being used.
Never work on a scale system while the machine is running.
Wear appropriate eye protection when drilling and welding.
When raising equipment off the ground, securely block it to prevent rolling and use safety stands to support the raised equipment.

The scale system can be installed in a variety of ways, each dependent upon the specific application and machinery involved. This section describes the basic principles to insure a trouble-free installation.

To avoid damage to the scale components, observe the following precautions:

Handle all Weigh Bars carefully so that their cables are not cut, pinched, or pulled loose. Damage to a Weigh Bar cable cannot easily be repaired and may require replacement of the entire assembly.

Make sure that all mounting hardware is securely tightened. Loose hardware can cause part failures, and inaccurate weight readings.

See warning at left. If welding must be done near the scale, please take the following precautions:

1. Disconnect all cables going to the indicator.
2. Ground the welder as close to the weld as possible.
3. Do not weld with the Weigh Bar between the ground and the point of the weld.

Make sure that all mounting hardware is securely tightened. Loose hardware can cause part failures and inaccurate weight readings.

Mounting the Weigh Bar 3-point Systems

Caution

Be sure to position the Weigh Bar so that the surface marked TOP or with a letter (T), which is stamped into the Weigh Bar, is up. Avoid cutting the cable or pulling it loose from the Weigh Bar.

If a PTO holder is available, install it in a manner that best protects the hitch-mount Weigh Bar.

To obtain the most accurate readings on adjustable height trailers always weigh products with the trailer at the same height. This is achieved by using a fixed reference point such as a chain fastened to the trailer.

Warning

Before removing the implement wheel, support the raised side with a safety stand under the main frame.

Locate the farm implement on a hard, level surface. Adjust the hitch jack or securely block the tongue so it is at the same height as when it is attached to the tractor drawbar.

Refer to Figure 1 and slide your Weigh Bar into the mounting tube. Secure with appropriate hardware.

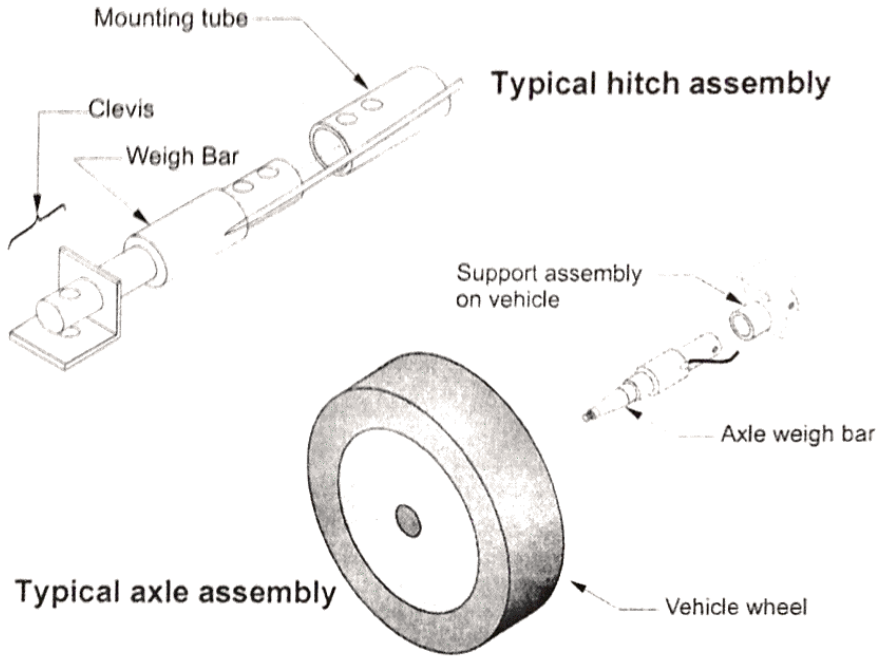


Figure 1

Block one wheel to keep the machine from rolling and then jack up the opposite wheel. Remove the dust cover, cotter pin, and slotted wheel nut. Pull the complete wheel assembly with bearings and seals off the axle.

Replace the axle spindle with the axle Weigh Bar and secure it in place with the hardware that was removed with the axle spindle.

Route the Weigh Bar cable to the indicator (refer to Routing The Cables section). If available, install a cable protector or secure the cable in the wheel well to keep it from being snagged.

Grease the spindle end of the axle Weigh Bar and reinstall the seals, or new seals if needed, bearings, and wheel assembly. Tighten the spindle nut until there is no slack in the bearings, then back the nut off until the first slot lines up with the hole in the spindle, and insert and spread the cotter pin. Install the dust cap, and lower the raised implement to the ground.

> High lift trailers will require special care in mounting the Weigh Bars. Raising and lowering the trailer changes the angle at which the weight is applied to the Weigh Bar. The normal procedure is to mount the Weigh Bar so that when the trailer is in the raised position the weight is applied to the top of the Weigh Bar.

Mounting Single-ended Weigh Bar (4-point Systems)

In 4-point systems, the load to be weighed is supported by four Weigh Bars, one at each corner. Each Weigh Bar cable is connected to the scale indicator or to a junction box.

Figure 2 shows an exploded view of single-ended Weigh Bars, mounting brackets, types of support brackets that can be used, and associated hardware. One end of the Weigh Bar is held stationary in the mounting bracket. The mounting bracket is bolted to a base-plate embedded in a concrete support pier (for platform scales) or to the equipment frame (for equipment mounted scales). Support brackets are fastened onto the scale platform or equipment box, etc. and fit over the other end of the bar. The support brackets are allowed to slide a small distance on the Weigh Bar so they will not bind as the Weigh Bars flex.

Make sure that all four Weigh Bars are level with each other. Add shims if needed. Shims should be the same size as the base plate.

Make sure that there are no bumps, etc. under the mounting brackets that could allow them to shift when weight is applied.

Be sure to position the Weigh Bar so that the surface marked TOP or with a letter (T), which is stamped into the Weigh Bar, is up. Avoid cutting the cable or pulling it loose from the Weigh Bar.

The support brackets must be positioned so that the weight is applied to the top of the Weigh Bar and not from the 11 o'clock or 1 o'clock position.

In custom installations, such as truck mounted scales, take care to mount the Weigh Bars so they can easily be removed for replacement. If brackets are to be welded in place, remove the Weigh Bar during the welding operation. Either the mounting bracket or the support bracket may be welded, **not both**.

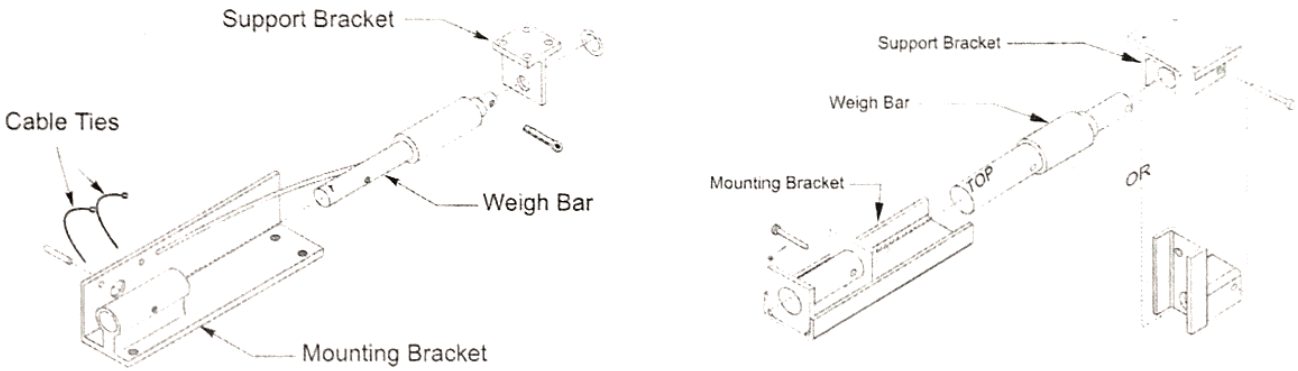


Figure 2
Single-ended Weigh Bars

Mounting Double-ended Weigh Bar (4-point Systems)

Figure 3 shows an exploded view of a double-ended Weigh Bar, support bracket, mounting brackets, and associated hardware. Note that the support bracket is fastened to the middle of the Weigh Bar and that the Weigh Bar ends are supported in mounting brackets.

Double-ended Weigh Bars are used in platform scales where the support bracket is fastened to the main supporting beam of the platform and the Weigh Bar mounting bracket is bolted to a base plate. The base plate is fastened to bolts embedded in a concrete support pier.

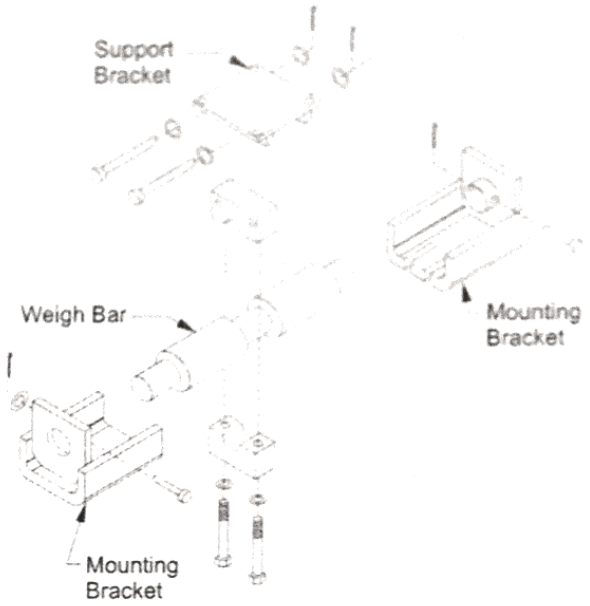


Figure 3
Double Ended Weigh Bars

Mounting The Scale Indicator

The scale indicator usually mounts on a quick-detach bracket which is bolted in place. The mounting location should be carefully selected for convenient scale operation as well as other operations that must be performed while weighing. The indicator should not interfere.with other operations and should be installed in a protected location.

Hold the scale indicator at the proposed mounting location and verify that the display can be easily read and that the controls can be easily operated. Mark the location for the mounting bracket. Using the mounting bracket for a template, mark and drill the holes. Mount the bracket with the wide end at the top. If bolts are used to mount the bracket to machinery, use either double nuts or self-locking nuts to prevent the hardware from working loose and falling into the machinery.

Insert the indicator bracket into the mounting bracket and press down. If the indicator is used on portable machinery, tie a SAFETY WIRE (refer to Figure 4) around the indicator bracket and the mounting bracket to keep the indicator in place.

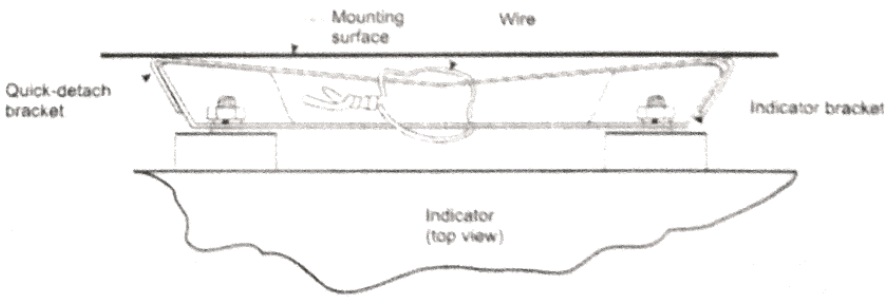


Figure 4
Safety wire installation

Routing the Cables

It is important to route all cables so that they do not interfere with machinery operation, and are securely fastened to the machinery. To limit the possibility of cable damage route the cables through hollow frame members, fasten the cables to the frame at 18 inch (45 cm) intervals, and secure all excess cable out of the way. The cables should not touch any moving parts of the machine and ample slack should be left where the machine may twist or flex. The cables should be secured to the machine within 12 inches (30 cm) of the indicator. Refer to Figure 5 for suggested methods of securing the cables.

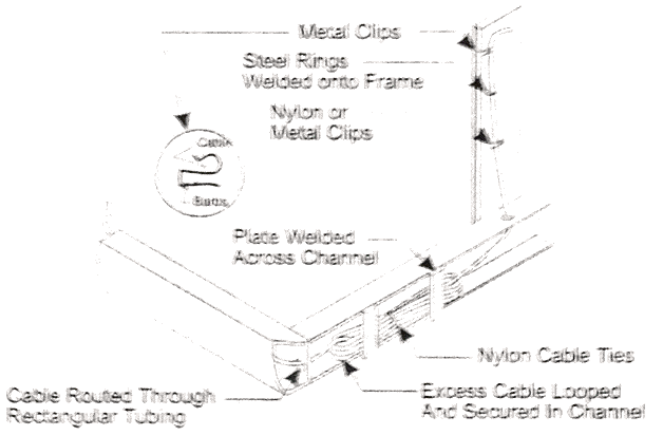


Figure 5
Cable securing methods

Scale Indicator Connections

Plug the cables from the Weigh Bars into the connectors on the bottom of the indicator (refer to Indicator User's Manual). On 3-point systems with (4) Weigh Bar connectors on the indicator, an adapter plug (Avery Weigh-Tronix P/N 11891-0017 for units having four-pin connectors or P/N 21575-0027 for units having five-pin connectors) must be connected to the unused Weigh Bar connector. Hand tighten the locking collars. Connect the power cable to the power connector. If an external alarm horn or light is used, connect it to the alarm connector. The voltage available at the alarm connector is normally the same as the input voltage.

All Avery Weigh-Tronix Farm Scale indicators can be operated on 11-15 VDC negative ground. An optional external alarm light or horn, for those indicators so equipped, is available from Avery Weigh-Tronix for use on 12 VDC systems only. A power convertor can be used to provide 12 VDC when the system can be connected to 115 VAC.

Connecting The Power Cable

When power is obtained from a tractor or truck, connect a single wire from the tractor plug to the vehicle battery (refer to Figure 6). Mount the tractor plug so it points toward the rear of the vehicle to provide automatic disconnecting of the cable if it is inadvertently left connected after unhitching the implement.

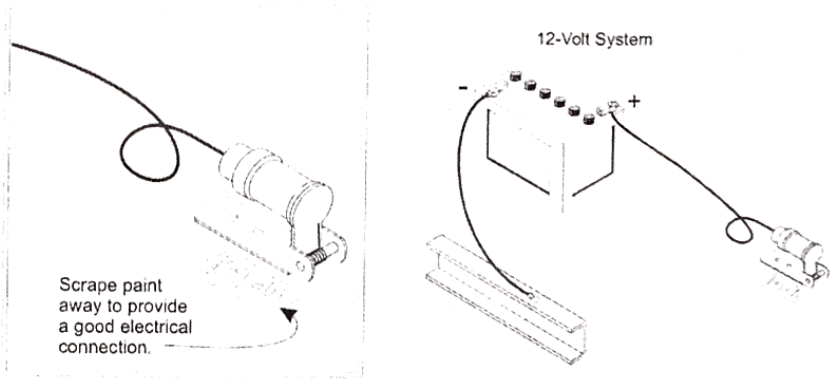


Figure 6
Battery connection details

Preventative Maintenance

If properly cared for a Farm Scale System can provide years of satisfactory service. A few minutes of preventive maintenance each week will avoid costly shutdowns for repairs.

The following preventive maintenance procedures should be performed each week:

1. Check the hitch-mount Weigh Bar bolts and tighten them if loose. Loose hitch bolts can cause inaccurate readings.
2. Check and hand tighten the connectors on the bottom of the indicator.
3. Inspect all cables to verify that they are not cut, pinched or broken.
4. Check all cables to verify that none are hanging from the frame where they might snag or break.
5. If an auxiliary battery is used as a power source for the scale, keep it fully charged between uses.
6. Carefully clean the display window with a soft, clean cloth dampened with water.

Troubleshooting the System

Avery Weigh-Tronix scale systems are designed and built to be rugged and dependable. This rugged dependability can only be insured if the system is properly installed and maintained to protect the system components and cables from damage.

If a problem appears, check the indicator's operating controls to make sure they are properly set for the desired operation. Make sure that +12 VDC is being supplied to the indicator. Disconnect all but the power cord to the indicator. If the indicator will not stay on or zero-out with the Weigh Bars disconnected, then there is a problem with the indicator. If the indicator appears OK, then you will need to troubleshoot the Weigh Bars and, if applicable, the junction box.

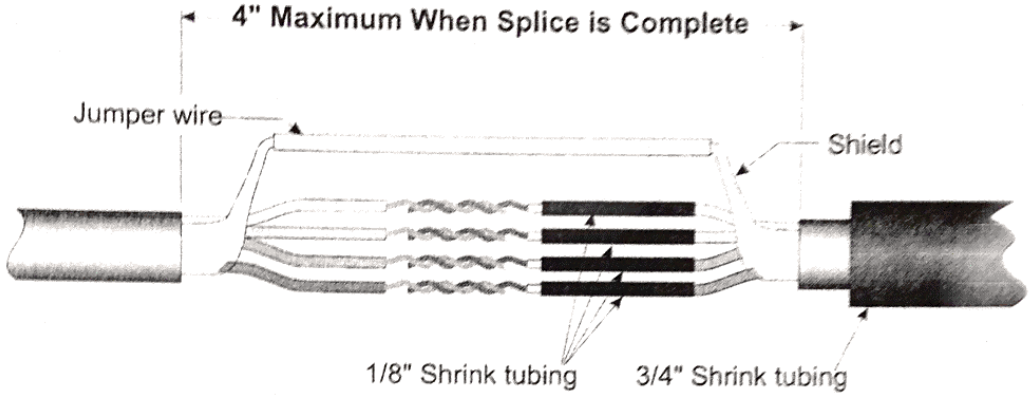
There are several ways to determine if a Weigh Bar is causing a problem. On any system, position a weight (person or heavy object) on the scale above each Weigh Bar one at a time, and compare the weight readings. With the weight directly over one Weigh Bar, the displayed reading may not be exact, but the weight readings obtained with the same weight over each Weigh Bar should be very close to each other. A Weigh Bar reading that differs significantly from the other Weigh Bars may have a broken, cut, or pinched cable. If the cable appears to be in good condition the Weigh Bar may have failed.

If a cable is damaged, repair it with a splice kit, Avery Weigh-Tronix P/N 19741-0012, to prevent shorting and prevent moisture from getting into the cable.

If the connector on the cable is damaged, a pre-potted replacement (pigtail) connector assembly is available. The five-pin (pigtail) connector assembly is P/N 23581-0017. Use the above mentioned splice kit for connecting the pigtail to existing cable.

Repair Procedure For Splicing Cables

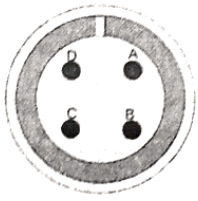
1. Cut away the damaged section of the cable to leave the cut ends clean.
2. Strip approximately 3" of the cable jacket from one cable end and 1.5" from the other cable end exposing the braided shield wire.
3. Cut the shield wire leaving it exposed 1" beyond the cable jacket.
4. Using a scribe or small screwdriver to unbraid the 1" lengths of exposed the shield wires. Twist the wire strands together to form a wire on each cable.
5. Strip approximately 5/8" of insulation from the remaining wires on each cable.
6. Slide the 6" length of 3/4" shrink tubing down one section of cable.
7. Cut the 1/8" shrink tubing into 1½" lengths and slide one piece onto each of the stripped insulated wires on one section of cable.
8. Align the two sections of cable together and twist the same color wires together as shown below.
9. Solder each wire junction with the resin core solder provided. Be sure that all the wire junctions are smooth with no bumps or sharp edges. A good solder connection will look shiny and not have a dull or cracked surface.



10. After the junctions are soldered and cooled, slide the pieces of 1/8" shrink tubing over each junction. Be sure that only the wire insulation is visible out of each end of the tubing. Use a match, lighter, or electric hair dryer to heat the shrink tubing causing it to shrink and seal the junctions on the insulated wires.

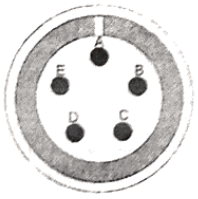
11. Couple the wire shields together using the length of copper wire provided. This is necessary so both sections of cable will be guarded against radio frequency interference which can affect weigh bar operation.

12. Use a torch or heat gun to shrink the 3/4" tubing so it forms a watertight seal across the repaired area. The 3/4" tubing is very thick so heat must be applied long enough to ensure adequate shrinkage. Apply the heat evenly to avoid scorching or burning the tubing.



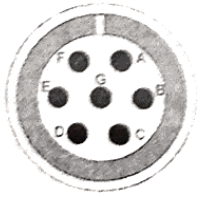
4-Pin

A-Shield
B-Red
C-Black
D-White



5-Pin

A-Red
B-Green
C-White
D-Black
E-Shield



7-Pin

A-Red
B-Green
C-White
D-Black
E-Blue
F-Yellow
G-Shield

Five-pin Systems

If your indicator will not zero with the Weigh Bars disconnected, then the problem is in the indicator; refer to the indicator service manual or contact your Avery Weigh-Tronix dealer.

If you are able to zero the indicator with the Weigh Bars disconnected the problem is probably in the Weigh Bars. Re-connect the Weigh Bars one at a time and attempt to zero the indicator. If, after connecting a Weigh Bar, you are unable to zero the indicator, that Weigh Bar may have a broken, cut, or pinched cable. If the cable appears to be in good condition, the Weigh Bar may have failed.

Indicators with (4) five-pin Weigh Bar connectors should display the following weight readings depending upon the number of Weigh Bars connected

to the indicator. With only one Weigh Bar connected the displayed weight should be about 4 times the weight applied directly over the connected Weigh Bar. With only two Weigh Bars connected, the displayed weight should be about twice the applied weight. With only three Weigh Bars connected the displayed weight should be approximately the applied weight + 50% of the applied weight's value. With all four Weigh Bars connected the displayed weight should be very close to 100% of the applied weight. (If adjustment at 100% is needed, refer to the indicator service manual for calibration procedures.)

Indicators with (3) five-pin Weigh Bar connectors, or an indicator with (4) five-pin Weigh Bar connectors and using one Adapter Plug will give the following weight readings. *On (3) Weigh Bar connector indicators the Adapter Plug is internally part of the indicator base assembly.* With one Weigh Bar connected the displayed weight should be about twice the applied weight. With only two Weigh Bars connected the displayed weight should be approximately the applied weight + 50% of the applied weight's value. With all three Weigh Bars connected the displayed weight should be very close to 100% of the applied weight. (If adjustment at 100% is needed refer to the indicator service manual for calibration procedures.)

An Adapter Plug electronically represents a Weigh Bar with no weight applied.

Testing the Five-pin Weigh Bar

With an ohmmeter check for the following readings.

READINGS	SINGLE ENDED WEIGH BAR TOLERANCES	DOUBLE ENDED and P/N 48479-xxx WEIGH BAR TOLERANCES	PINS	WIRES
	350 ohms +5%	350 ohms +5%	A to C	Red to White
	350 ohms +5%	370 to 390 ohms +5%	B to D	Green to Black
	OPEN	370 to 390 ohms +5%	E to All	Shield (Wht/Orn) to all
	262 ohms +5%	262 to 282 ohms +5% These two readings should match	A to B	Red to Green
	262 ohms +5%	262 to 282 ohms +5%	B to C	Green to White
	262 ohms +5%	282 ohms +5% These two readings should match	C to D	White to Black
	262 ohms +5%	282 ohms +5%	A to D	Red to Black

Four-pin Systems

Any Avery Weigh-Tronix indicator having 4-pin connectors must have (4) Weigh Bars or adapters attached in any combination in order to hold zero.

Indicators with four-pin, (3) Weigh Bar connectors and (4) Weigh Bar connectors must use (4) Weigh Bars or adapters in any combination for normal scale operation. (On (3) Weigh Bar connector indicators the adapter plug is internally part of the indicator base assembly.) If the Indicator cannot be coarse-zeroed when the scale is empty, unhook all the Weigh Bars and try to zero the indicator.

If the indicator will not zero out refer to the indicator service manual or contact your Avery Weigh-Tronix Dealer.

If the indicator zeros out, obtain an extra four-pin adapter plug P/N 11891-0017. Re-connect the Weigh Bar cables. Replace one Weigh Bar cable connected to the scale indicator with the extra adapter plug, then try to zero the indicator. Repeat this procedure with each Weigh Bar cable one at a time. If after replacing a Weigh Bar with the adapter plug you can zero out the indicator that Weigh Bar may have failed or have a broken, cut, or pinched cable.

Testing the Four-pin Weigh Bar

With an ohmmeter check for the following readings.

READINGS	TOLERANCES	PINS	WIRES
_____	240 ohms +5%	B to C	Red-Black
_____	240 ohms +5%	C to D	Black-White
_____	480 ohms +5%	B to D	Red-White
_____	OPEN	A to All	Shield (White/Orange) to All

If an Avery Weigh-Tronix dealer is unavailable, the indicator may be sent back to the factory for repair. Indicators may be sent prepaid to:

AVERY WEIGH-TRONIX, INC.
SERVICE DEPARTMENT
1000 NORTH ARMSTRONG DRIVE
FAIRMONT, MN 56031 U.S.A.

Enclose the following information with the indicator:

Your name, address, and telephone number.
Dealer's name, address, and telephone number.
Date purchased.
Type of implement on which the system is installed.

Symptoms of the problem.

Please provide the following types of information:
•Is the indicator affected by cold? Heat? Moisture?
•Is the indicator sensitive to vibration?
•Is the problem constant or intermittent?

An accurate description of the problem helps to ensure a prompt and reliable repair.