MSI4260

PORT-A-WEIGH CRANE SCALES

User Guide

*Quality
Industrial
Weighing
and Force
Measurement
Equipment*

Measurement Systems International

IMPORTANT
Please read this manual carefully before using the MSI-4260 Port-A-Weigh

Program Number _____   Capacity and Resolution _____

Serial Number _____   Cal Number _____

TABLE OF CONTENTS

INTRODUCTION

The MSI-4260 Port-A-Weigh is an electronic, self-contained, battery-operated crane scale. The scale is made up of three separate sections which house the electronics, load cell and battery respectively. The sections are bolted together and sealed agaist moisture by the use of O-Rings. The scale housing is made of impact resistant, marine grade 356 alloy. All electronics are shock mounted and the display window is impact resistant polycarbonate. The accuracy of the scale meets or exceeds the requirements of National Institute of Standards Technology, Handbook 44. For most scales, this is 0.1% of applied load.

SPECIFICATIONS

Accuracy:	± 0.1% of applied load ± one displayable increment
Resolution:	Standard displayed resolution: 2500 counts Internal A/D resolution: 1,048,576 counts (20 bits)

Capacities:

lb	500	2000	5000	10,000	20,000	30,000	50,000	70,000	100,000
kg	250	1000	2500	5000	10,000	15,000	25,000	35,000	50,000

Power:	Battery operated, rechargeable sealed lead acid battery pack up to 100 hours of battery life with Automatic Sleep Mode and Automatic Power Off
Display:	5 digit, large 1.2 in (30 mm) high numeric LED with selectable brightness control
Operating Temperature:	+14°F to +140°F (-10°C to +60°C) NTEP range -10°C to +40°C
Operating Time:	100+ hours depending on brightness settings and average number of sements lit
Enclosure:	Marine grade 356 alloy, sealed to NEMA 4/IP66
Load Cell:	Standard 350 Ω Bridge
Indicators:	Low Battery, PEAK, MOTION, Center of ZERO, NET, GROSS, TOTAL, X1000, kg/lb, SP1, SP2
Function buttons:	POWER - Turns scale on and off ZERO - Zeros applied load up to 100% of capacity TARE - Tares applied load and displays weight in Net mode, and returns the scale to Gross mode F1 - User programmable function switch for use as Test, Unit Select, Total (Auto or Manual), Peak Hold and Set Points.
Calibration switch (located behind seal screw):	Initiates full digital calibration procedure
Function Switch options:	TEST (default), TOTAL, UNIT, PEAK, NET/GROSS, OFF
Auto Zero Maintenance:	Standard, can be disabled internally
Auto-Off Mode:	Prolongs battery life by turning POWER off after 12 minutes or one hour (operator determined) of no scale activity
Auto-Sleep Mode:	Prolongs battery life by dimming LED display after one minute of no activity
Unit:	kg, lb (other Units available with custom calibrations)
Filtering:	Low (LO), Medium (HI-1), High (HI-2)
Totalization:	Standard: Press button or Automatic; TOTAL weight up to 99999 X 1000 kg or lb
Peak:	Uses unfiltered faster reading of A/D

Set Points: Two internal standard Set Points and two ultra-bright LEDs on indicator panel

Service Counter: Two independent 24 bit registers; Register 1 updated each time weight exceeds 25% of capacity; Register 2 updated each time weight exceeds overload; when register 1 exceeds 99,999 or register 2 exceeds 1000, display reads "LCnt" for load cell counter; Test function shows the two readings in order

Connectors: Connections are made with PCB mounted terminal strips allowing easy upgrading. Cables are brought out through water tight fittings

Optional Remote Controller: Option includes On/Off, Zero, Tare, Net/Gross, Total, View Sum, and programmable function keys

All of these features are housed in a single, low-profile, cast aluminum housing consisting of three sections:
1) The front of the scale houses the display, controls and all necessary electronics.
2) The center section contains the load cell, lifting eye and hook.
3) The rear of the scale features a quick access battery compartment.

> **WARNING:** The scale has a safe mechanical overload of 200%, and an ultimate overload of 500%. Overloads greater than 500% may result in structural failure and dropped loads. Dropped loads may cause serious personal injury or death.

FEATURES

- Designed to meet or exceed US and International Standards

- Over 100 hours of weighing time utilizing Automatic Sleep Mode

- Automatic Power Off conserves battery life by sensing no activity after 12 minutes or one hour, determined by operator, and turns Power off

- Automatic Sleep Mode preserves battery life by dimming the LED display after one minute of no activity

- Rugged construction throughout. Buttons are sealed and rated for over 1 million operations

- Precise high resolution (2500 - 5000 division standard and up to 10,000 possible) 20 bit A/D conversion coupled with advanced 16 bit micro controller provides world class features and accuracy

- Five large, 1.2 inch LED digits for clear weight readings from a distance

- Easy to maintain: Full digital calibration assures reliable, repeatable measurements

- Selectable for kgs/lbs; unless prohibited by regulations

- Automatic or manual weight totalization for loading operations

- Easily customized for special applications

- PEAK Mode for stress analysis

- Two Set Points can be set for any in-range weight for operator alearts or process control

The LED display provides excellent readability from full sunlight to total darkness.

5 Digit LED Weight Indication

→0← ~ BT I II TTL NET PK kg lb x1K

Center of Zero
Motion Detect
Low Battery Warning
Set Point 1 and 2 Annunciation
Totalizing

6th Digit Substitution
Units in Pounds
Units in Kilograms
Peak Hold
Net Mode

In the event of an overload condition, the display will flash a warning to the operator.

Overload Display:
"Error" flashes alternately with "LOAd"
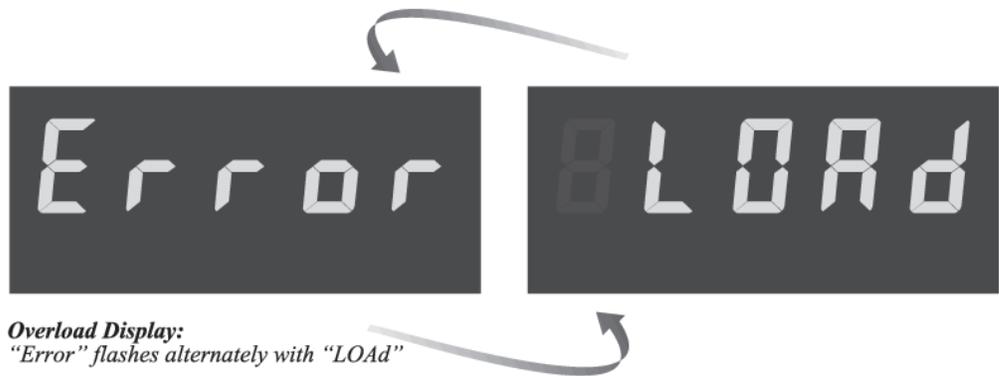
OPTIONS

Options which you may have ordered with your Port-A-Weigh may include the following:

• NTEP approval for use in commercial trade
• Substitute shackle for bottom swivel hook
• Oversized top lifting eye or shackle
• Universal direct power supply: 85-265 VAC, 47-440 Hz / 100-300 VDC
• Heat shield for high temperature applications
• Factory Mutual approved (intrinsically safe for use in hazardous environments)
• RF Remote Controller

UNPACKING

When unpacking the scale from the shipping container, ensure that all assembly parts are accounted for. Check the scale for any visible damage and immediately report any damage to your shipper. It is advisable to use the original shipping container when shipping or transporting the Port-A-Weigh.

BATTERY PACK
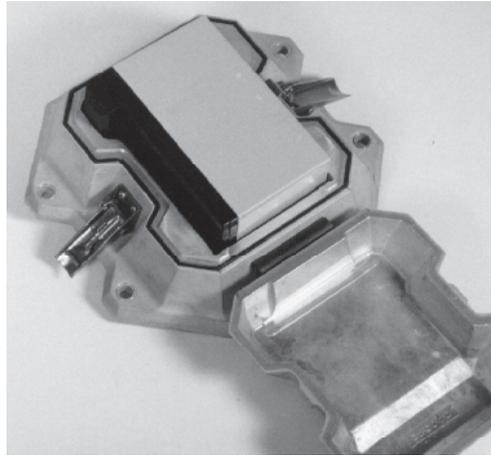
The Port-A-Weigh is powered by a 12 volt rechargeable battery. The battery is located in the rear compartment of the scale. Two stainless steel fasteners secure the battery access door. To remove the battery for charging; unlatch the fasteners and pull the battery straight out. The battery will automatically disengage from its connectors and may be plugged into the battery charger for recharging.

BATTERY OPERATION

The battery will operate continuously for 100 hours with the LED display before requiring recharging. The Port-A-Weigh will alert you when the battery is within 2 hours of requiring recharging by illuminating the "BT" (Low Battery) annunciator.

When the battery requires recharging, the weight reading on the display will be replaced by "LO", after which the scale will shut itself off to prevent battery damage. If the On button is depressed at this point, "LO" will reappear and then the scale will again deactivate automatically.

Instructions for charging are located on the battery charger. Charging time for a completely discharged battery is approximately 16 hours. A spare battery pack is recommended to keep the Port-A-Weigh continuously operational.

Note: More frequent charging of the battery prolongs its life.

BATTERY LIFE

The MSI-4260 battery life depends on a number of factors: Brightness of the LED display, the number of segments lit, and the age and condition of the SLA (sealed lead acid) battery. The MSI-4260 will automatically turn the scale off when the SLA battery drops to approximately 10.5V. You must recharge the battery when this happens. Leaving a discharged battery in the scale, which has a maintenance battery drain, can result in a deep discharge battery which will shorten its service life.

SLA batteries do not suffer from memory effects and actually benefit from frequent recharg-

MEASUREMENT SYSTEMS INTERNATIONAL

ings. Recharge the battery whenever it is convinent even when it still has available life. Due to the maintenance discharge imposed on the battery by the MSI-4260 electronics, do not store the MSI-4260 away with the battery inside. Remove the battery if the MSI-4260 will not be used for more than 2 weeks.

Battery Use Guidelines
1) Recharge whenever convenient. Do not wait for the scale to shut itself off if your work situation permits.
2) If you need the scale continuously, keep a fully charged spare battery at hand. Replace the drained battery as close as possible to the low battery warning or earlier.
3) SLA batteries that have not been deep discharged should withstand 500 to 1500 charging cycles.
4) The low battery warning will indicate about 2-4 hours of additional use before the MSI-4260 turns itself off.
5) If the MSI-4260 is not going to be used again soon, remove the SLA battery to prevent deep discharge while the unit is in storage.
6) Recycle the battery to an authorized recycling center when average life drops to 20 hours or less.

BATTERY CHARGER

Each Port-A-Weigh is shipped with a battery charger designed to charge and maintain the battery. Exact charging time will depend on the degree of discharge of the battery. A battery removed when the low battery warning first appears should take about 4 hours to fully charge.

When the battery is new, it may take significantly longer for the initial charge. MSI recommends charging a new battery for 24 hours. It might take several charge/discharge cycles before full capacity is reached. Deep discharge batteries will also take significantly longer to charge.

Using the Charger
1) Remove the battery from the MSI-4260. See previous page for removal instructions.
2) Connect the charger assembly to the AC supply (86-260VAC). The Power Status light should be green. If the Power Status light fails to illuminate, check your AC power connection and make sure the Vin jack is fully seated. AC power cords suitable for any world location are available from MSI.
3) Plug in the polarized connector to the jacks on the battery.
4) The Charge Status light should turn orange, indicating fast charge.

 If the status light remains green when the battery is first plugged in, the battery may be defective.

5) Charge until the status light turns green.

When the charge cycle is complete, you can (and should) leave the battery on the charger until it is needed. The charger keeps a maintenance float charge on the battery to ensure the best possible operation times. For scales that are in high usage, MSI recommends obtaining a spare battery so one can always be on the charger.

Page 8   MSI-4260 Port-A-Weigh • User Guide
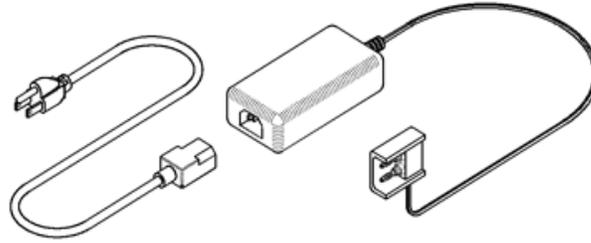
The charger is a universal input type and is rated for 100-240VAC, 50-60Hz. AC power cords suitible for any world location are available from MSI.

BATTERY REMOVAL AND REPLACEMENT

1) Turn the MSI-4260 off.
2) With one hand, hold the battery access cover.
3) Release the two latches holding the access cover.
4) Carefully lower the cover and when possible, hold the battery in place. The battery might be loose and subject to falling.
5) Remove the battery by pulling straight back.
6) Install a fully charged battery by plugging it in to the exposed battery jacks. The MSI-4260 may or may not turn on once the new battery is installed.
7) Reseat the access panel.
8) Reset the latches. Insure the latches are completely latched and the plate is firmly in place.

OPERATION GUIDE

Port-A-Weigh operation is controlled by four push buttons located below the display window.

The four pushbutton functions are as follows:

POWER

Function
Turns the scale on/off (toggle action).

Use
1) The battery pack must have enough charge to ensure accurate operation (>10.5V).
2) Ambient temperature must be greater than -10°C and less than 60°C (14°F to 140°F).

Action
1) Press **[POWER]** and hold for one second.
2) Display check: All segment and indicator LED's are illuminated for one second.
3) Numerics display the software version number for one second.
4) Any weight on the scale up to 5% of capacity will be automatically zeroed.
5) During display test, all internal operations are checked and any non-conformance causes an Error message display.

Final
Scale reads the current weight in the last set Mode (NET, GROSS, PEAK NET, PEAK GROSS).

ZERO

Function
Sets scale to ZERO.

Use
1) The scale must be stable. The scale will not ZERO if the motion detect indicator is on.
2) The scale must be in the GROSS Mode. The scale will not ZERO in NET Mode.
3) The scale will accept a ZERO setting over the full range of the scale (Legal For Trade models might have a limited ZERO range). ZERO settings greater than 5% of capacity will subtract from the overall capacity of the scale.

Action
1) Press **[ZERO]**. The weight reading must be stable within ±1 division. If this condition is met, the digits display "0" (or "0.0" or "0.00", depending on resolution).
2) The ZERO setting is stored in backup memory, and the setting will be restored the next time the scale is turned on.

Final
Digits display "0" (or "0.0" or "0.00", depending on resolution).

TARE

Function
TARE IN - Stores a TARE weight when in GROSS Mode and displays all subsequent readings in NET Mode; or, TARE OUT - Clears the TARE weight when in NET Mode and returns the scale to GROSS Mode.

Action
TARE IN
1) Press **[TARE]**.
2) The scale must be in GROSS Mode: The entire range of the scale can be tared.
3) The Motion indicator must be off and the weight reading must be stable. (The weight reading must be stable within ± 1 division).
4) If the Motion condition is met, the NET indicator lights and the weight registers "0". All subsequent readings are deviations from the set TARE value.

5) Only positive weight readings can be tared.
6) Setting or changing TARE has no effect on the ZERO setting.
7) Tareing will reduce the apparent overrange of the scale. For example, if a 1000 lb container is tared and the scale capacity is 5000 lb, the scale will overload at a new weight of 4000 lb (5000 - 1000) plus any additional allowed overload (usually 9 divisions).
8) TARE value is stored in backup memory, and the value will be restored the next time the scale is turned on.

TARE OUT
1) The scale must be in NET Mode.
2) Press **[TARE]** to clear the value.
3) Returns to GROSS Mode.

Final

TARE IN
TARE is set, displaying NET weight.

TARE OUT
TARE weight will be cleared and the scale will revert to GROSS Mode.

F1

Function
F1 can be programmed to any of five functions:
TEST (tESt), NET/GROSS (nEtGr), TOTAL(totAL), UNIT(kg/lb) and PEAK(Phold). See Scale Setup for instructions on programming the F1 function button.

Action
Press **[F1]** to initiate the preprogrammed function.

TEST (tESt)

Function
Provides a functional system test, and an on-demand display check without disturbing the current weighment. Also provides calibration verification in the form of a load cell CAL number.

Action
1) Press **[F1]** (Function button must be programmed as Test (see Scale Setup)).
2) Battery condition is displayed in Percent of battery life remaining with b = xxx figure from 0 to 100 on the digits (in 5% increments).
3) All segments and indicators are dis-

Display Test Sequence

Battery condition in percent remaining . . .

all segments and indicators are displayed for 3 seconds . . .

CAL number is displayed . . .

and all digits count once from 0 to 9.

played for 3 seconds.

4) The CAL number is displayed next. To ensure that the CAL number is accurate, the scale must be unloaded. Cal number shifts of up to 10 counts are insignificant.

5) All digits (7 segment and 16 segment) count once from 0 to 9. All indicators are tested.

6) Internal tests are performed to further ensure scale integrity.

Final

The reading returns to the last condition, or an Error message is displayed.

ACCESSING THE SERVICE COUNTERS

Function

Port-A-Weigh maintains two service counters for safety, and two service counters that monitor internal electronics. These Service Counters are used to judge when the load bearing elements or electronic components should be inspected.

LCnt1 will be displayed for 1 second followed by . . .

Action

1) To access the Service Counters, program the F1 button to TEST (tESt).

2) Press **[TEST]** and hold until the display reads "LCnt1" (Load Counter #1). This will occur after the RCAL value has been displayed. "LCnt1" will be displayed for 1 second, followed by a flashing numeric value. This value signifies the number of weighments that exceeded 25% of capacity.

a flashing total of "over 25%" weighments.

3) Press **[TEST]**, "LCnt2" (Load Counter #2) will be displayed for one second, followed by a flashing numeric value. This value signifies the number of weighments that surpassed capacity.

LCnt2 will be displayed for one second followed by . . .

4) Press **[TEST]**, "A2DEr" (A2D Errors) will be displayed for one second, followed by a flashing numeric value. This value signifies the number of times the internal microprocessor has reset the analog to digital converter.

a flashing total of "over capacity" weighments.

5) Press **[TEST]**, "EE Er" (EEPROM Errors) will be displayed for one second, followed by a flashing numeric value. This value signifies the number of retries needed to successfully read from or write to the long term memory module.

6) Press **[TEST]** again to complete the TEST sequence.

Final

TEST sequence continues.

RESET THE SERVICE COUNTER WARNING

1) After inspecting the load train, remove the calibration seal screw.
2) Push the Calibration button using a blunt screwdriver.
3) Push **[ZERO]** to return to normal operation.

Note: This procedure does not reset the service counter.

TOTAL (totAL)

Function
For accumulation of multiple weighments. The accumulator always uses the displayed weight, so GROSS and NET readings can be added into the same TOTAL. There are two Modes of totalizing: Manual and Auto. The Manual Mode requires the TOTAL button be pressed with the weight on the scale. The weight will be added to the previously accumulated value. The Auto Mode will automatically add the last settled and stable value to the TOTAL. Both Modes require that the weight on the scale return within 1% (relative to full scale) of GROSS ZERO or NET ZERO before the next weighment can be added. This assures that a weight on the scale is only added to the total once. Applied weight must be 2% of full scale above GROSS ZERO or NET ZERO before it can be totaled.

MANUAL TOTAL

Function
Allows for accumulating weight manually by pressing a button.

Use
1) The Motion indicator must be off, the scale must be stable ±1 division. If there is considerable motion on the scale, use the Medium or High Filter setting (see Filter Setup). The scale will accept the TOTAL button when in motion, but will not TOTAL until the Motion indicator is off.
2) Only positive readings can be accumulated.
3) After a weight is totaled, the weight on the scale must return below 1% of full scale capacity relative to GROSS ZERO or NET ZERO before another weight can be added to the TOTAL. This assures that a weight on the scale is only added to the scale once.
4) Press **[F1]** (Function button must be programmed as TOTAL (see Scale Setup).
5) If the Motion indicator is on, the TOTAL indicator will begin blinking, and continue blinking, until motion stops and the Motion indicator turns off. The current weight is added to the TOTAL register and the TOTAL weight is displayed.
6) The TOTAL indicator (center right of display) will also illuminate for 4 seconds providing reinforcement that the TOTAL command was accepted.

Final
After totaling, normal weighing resumes.

AUTO TOTAL

Function
Allows for Auto accumulate.

Use

1) When a weight threshold of 2% of Full Scale (FS) above NET ZERO or GROSS ZERO is exceeded, the accumulate function operates automatically.
2) When a weight that meets the minimum acceptable limit settles (no Motion), the TOTAL indicator will flash 3 times.
3) If the weight changes to a new settled value the TOTAL indicator will flash again indicating the previous settled reading has been replaced.
4) When a weight is totaled, the TOTAL indicator will flash for a steady 4 seconds, indicating the weight has been totaled and the TOTAL value will be displayed.
5) The displayed weight is added to the accumulated value in the TOTAL Register only when the weight returns to ZERO (±1% of Full Scale).
6) The last settled reading is what will be used for totalizing when the scale returns to ZERO.

> **WARNING** **WARNING:** The operator must take caution that, when removing the load, the scale does not go out of Motion; or an erroneous reading could occur. The last settled weight is actually added to the TOTAL when the scale returns to less than 1% of full Scale capacity.

Action

1) The scale cannot be in motion. An Auto TOTAL acceptable reading is indicated by 3 or more short flashes of the TOTAL indicator.
2) Weight readings must be greater than 2% of full scale, relative to NET ZERO or GROSS ZERO.
3) Each reading added to TOTAL must be preceded by a return to ZERO (NET or GROSS) ±1% of full scale. Totalization of the last settled weight is indicated by a 4 second flash of the TOTAL indicator, and a display of the current TOTAL.

Final

After totaling, normal weighing resumes.

TO CLEAR THE LAST TOTALLED WEIGHT

Function

If the last totaled (automatic or manual) weighment was a mistake, it can be erased with the following procedure. This erases only the last totaled value.

Action

1) Press **[F1]**, then **[ENTER/TARE]**. The display will read the revised TOTAL for 2 seconds. (This procedure assumes that you have not modified the F1 function.)

Final

After displaying the update TOTAL, normal weighing resumes.

TO CLEAR THE TOTAL VALUE

Function

To clear the TOTAL register in order to start a new series of totals.

Action

1) Press **[F1]**, then **[CLEAR/ZERO]**. (This procedure assumes that you have not modified the F1 function.)

2) The display reads "0" and the TOTAL indicator will illuminate for 2 seconds.

Final
After clearing the TOTAL, normal weighing resumes.

VIEWING TOTAL

Function
After a weight has been totaled or before the 1% threshold has been exceeded, the current TOTAL can be Viewed.

Action
1) Make sure there is no load on the scale. Press **[F1]** (Function button must be programmed as TOTAL).
2) The current TOTAL will be displayed for 3 seconds. The TOTAL indicator will illuminate.

Final
Normal weighing resumes.

Caution: If in Manual TOTAL and you push the TOTAL button to view the TOTAL value, be certain that you are not weighing more than 2% of capacity. (If you press USER to view the TOTAL and the weight is above 2% of capacity, you will add to the TOTAL, rather than view the TOTAL.).

UNIT (lb/kg)

Function
To change unit between kg/lb.

Action
1) Press **[F1]** to select kg or lb Mode (Function must be programmed as Unit; see USER Setup). The kg and lb indicators are located on the front panel adjacent to their relative capacity labels.

Final
The correct unit of measurement/weight is displayed.

Alternate Method: Use the Setup UNITS Mode to change the UNITS without programming Function to UNITS.

PEAK (Phold)

Function
Allows the capture of a PEAK weight. Useful for stress testing and related operations where the maximum load measured is stored.

Action
1) Press **[F1]** (Function button must be programmed as PEAK(Phold); see Function Setup).
2) To enable PEAK(Phold), the PEAK indicator must be off. Press **[F1]**.
3) To disable PEAK(Phold) the PEAK indicator must be on. Press **[F1]**.

Final
1) When enabled, the PEAK (Phold) value is reset to 0 and any subsequent displayed value will correspond to the greatest positive weight detected.
2) When PEAK(Phold) is disabled the scale will perform normally.

NET/GROSS (nEtGr)

Function

Switches the display between NET and GROSS Modes. NET Weight is defined as GROSS Weight minus a TARE Weight.

Use
1) There must be a TARE weight established to switch from GROSS Mode to NET Mode (see TARE).
2) NET GROSS(nEtGr) will work even when the scale is in Motion.

Action
1) Press **[F1]** (Function button must be programmed as NET GROSS (nEtGr), see USER Setup).
2) No current TARE is stored (TARE =0). No action, display continues to read the Gross weight only.
3) A TARE value is stored: Toggles between NET and GROSS indicators.

Final

NET or GROSS indicator will illuminate.

SCALE SETUP

Function

Scale Setup facilitates changes to various internal settings of the scale. Setup initiated by holding in the F1 button while turning POWER on.

Action

When in SETUP, the following buttons are used for selecting and changing scale settings:

ZERO functions as CLEAR/EXIT: Used to exit from a Setup menu without affecting the previous setting and for exiting Setup Mode completely. Used also to clear the current digit when entering numeric values; i.e., Set Points.

TARE functions as ENTER: Used to enter into menus and choose menu items.

F1 functions as SELECT: Used to scroll through menu selections. If held down, SELECT will automatically repeat.

Final

Pressing **[CLEAR/ZERO]** will skip all remaining parameters and return the scale to normal operation. Pressing **[POWER]** will also exit the Setup Mode (and turn Power off).

QUICK USER SETUP GUIDE

Note: Display items in bold are defaults.

Top Menu	Selection Display	Sub-Menu	Display Definition
Func	OFF **tESt** totAl Unit Phold nEtGr		Function Off Test Total Unit Peak Hold Net/Gross
A-OFF	**OFF** .2 hr 1 hour		Automatic Power Off Off 12 minutes 1 hour
Filtr	**LO** HI-1 HI-2		Filter Low Medium High
LEdS	LO **HI-1** HI-2		Light Emitting Diodes Low Medium High
Unit	Unit(kg) **Unit(lb)**		Units Kilograms Pounds
StPt1	**OFF** GrEAt LESS	LESS,GrEAt followed by value	Set Point 1 Off Greater than Less Than
StPt2	**OFF** GrEAt LESS	LESS,GrEAt followed by value	Set Point 2 Off Greater Than Less Than
totAL	**OFF** PrESS Auto		Total Off Press User Button Automatic Total

FUNCTION (Func)

Function
Allows the F1 button to be programmed to TEST, TOTAL, UNIT, NET/GROSS or PEAK

Action
1) Hold in the **[F1]** button while turning on the power.
2) Press **[SELECT/F1]** until the display reads "Func".
3) Press **[ENTER/TARE]** and currently selected function will flash.
4) Press **[SELECT/F1]** until desired function is displayed.
5) Press **[ENTER/TARE]** to store or press **[CLEAR/ZERO]** to exit without changing.

Final

Setup menu is displayed. Press **[CLEAR/ZERO]** to return to normal operation or press to scroll **[SELECT/F1]** to a different USER Setup operation.

AUTOMATIC POWER OFF (A-OFF)

Function

The A-OFF feature, when enabled, prolongs the battery life of the scale by turning POWER off when the scale is not in use. Any time a button is depressed (any button), or the detected weight is in Motion, the time limit is reset. Therefore, the scale will stay on indefinitely if the weight is changing or any button is pressed at least once. With A-OFF disabled, the scale will remain on; only pressing POWER will turn it off.

Action

To Change the A-OFF Mode:
1) Hold in the **[F1]** button while turning on the power.
2) Press **[SELECT/F1]** until the display reads "A-OFF".
3) Press **[ENTER/TARE]**. You are now in the A-OFF menu.
4) Press **[SELECT/F1]** to choose: OFF, .2 hours (12 minutes), or 1 hour.

When the desired Mode is displayed, press **[ENTER/TARE]** or press **[CLEAR/ZERO]** to exit without changing.

Final

USER Setup menu is displayed. Press **[CLEAR/ZERO]** to return to normal operation or press **[SELECT/F1]** to scroll to a different USER Setup operation.

FILTER (Filtr)

Function

Allows three levels of filtering to stabilize readability of the weight display.

Use

1) Use LO (low setting), for most scale applications. It settles fastest and is intended for general use.
2) Use HI-1 (medium setting), when the scale is being used under conditions that cause light to medium swinging.
3) Use HI-2 (high setting), when there is significant scale motion. There is a time penalty when using the HI-2 setting. The operator should wait at least 5-15 seconds to ensure that the final reading has settled (motion indicator off). (Not available in some Legal For Trade scales).

Action

To change the Filter settings:
1) Hold in the **[F1]** button while turning on the power.
2) Press **[SELECT/F1]** until the message reads "Filtr".
3) Press **[ENTER/TARE]**. The currently selected filter will flash.
4) Press **[SELECT/F1]** to change from LO (low), HI-1(medium) or HI-2 (high) settings. When the desired Filter setting is displayed on the message display, pressor **[ENTER/TARE]** press **[CLEAR/ZERO]** to exit without changing the setting.

Final

Setup menu is displayed. Press **[CLEAR/ZERO]** to return to normal operation or press **[SELECT/F1]** to scroll to a different USER Setup operation.

LED BRIGHTNESS (LEdS)

Function

Sets the LED brightness to one of three fixed settings; or to an automatic setting that adjusts brightness according to ambient light, and also adjusts to the lowest level of brightness when the scale is inactive for 1 minute (Automatic Sleep Mode). Automatic Sleep Mode is recommended for minimizing battery consumption.

Action

1) Hold in the **[F1]** button while turning on the power.
2) Press **[SELECT/F1]** until "LEdS" is displayed.
3) Press **[ENTER/TARE]** and currently selected brightness will flash.
4) Press **[SELECT/F1]** to change from LO, HI-1 or HI-2 settings.
5) Press **[ENTER/TARE]** to store, or press **[CLEAR/ZERO]** to exit without changing.

Final

Setup menu is displayed. Press **[CLEAR/ZERO]** to return to normal operation or press **[SELECT/F1]** to scroll to a different USER Setup operation.

Note: To maximize battery life, set the LED to the Automatic Sleep Mode.

UNIT (kg/lb)

Function

Allows Units to alternate between kg and lb without the use of the USER button.

Action

1) Hold in the **[F1]** button while turning on the power.
2) Press **[SELECT/F1]** until "Unit" is displayed.
3) Press **[ENTER/TARE]**. The display will show "Unit" while the indicator which correlates to the currently set Unit (kg or lb) will flash.
4) Press **[SELECT/F1]** until desired Unit (kg or lb) is displayed.
5) Press **[ENTER/TARE]** to store, or press **[CLEAR/ZERO]** to exit without changing.

Final

Setup menu is displayed. Press **[CLEAR/ZERO]** to return to normal operation or press **[SELECT/F1]** to scroll to a different USER Setup operation.

Alternate Method: Program the USER button as UNITS or press **[SELECT/F1]** to scroll to a different USER Setup operation.

SET POINTS (StPt1, StPt2)

Function

Set Points provide warnings and indications of weighments. When the weight is above (greater than) or below (less than) a set value, the Port-A-Weigh can respond by turning on the Set Point indicator light.

SET POINT ENTRY

Function

To enter a Set Point.

Action

1) Hold in the **[F1]** button while turning on the power.
2) Press **[SELECT/F1]** to choose the Set Point you wish programmed. Set Point 1 will be used for this example.
3) When the display reads "StPt1" press **[ENTER/TARE]**.
4) Determine if the Set Point will be active when the weight is above ("GrEAt") or below ("LESS") the entered value. Press **[SELECT/F1]** to choose the mode. For an overload alarm, for example, you would choose greater. Press **[ENTER/TARE]**.
5) The current Set Point value will flash.
6) Press **[SELECT/F1]** to enter the first digit of the desired Set Point weight value (Value cannot exceed scale capacity). Continue to press **[SELECT/F1]** until the desired numeral for the digit is obtained, then press **[ENTER/TARE]**.

Note: Pressing **[SELECT/F1]** repeatedly will cycle through numeric values 0 to 9, and then 0 to 9 with the decimal point before repeating the cycle.

7) The next significant digit flashes. Press **[SELECT/F1]** to enter the next digit. Press **[ENTER/TARE]** twice after the last character to complete the Set Point entry.

Final

Setup menu is displayed. Press **[CLEAR/ZERO]** to return to normal operation or press **[SELECT/F1]** to scroll to a different USER Setup operation.

TO DISABLE A SET POINT

Function

To turn off a Set Point.

Action

1) Hold in the **[F1]** button while turning on the power.
2) Press **[SELECT/F1]** to identify the Set Point you wish to disable. Set Point 1 will be used for this example.
3) When the display reads "StPt1" press **[ENTER/TARE]**.
4) Press **[SELECT/F1]** until the message "OFF" appears. Press **[ENTER/TARE]**. This disables the Set Point and returns you to the Set Point menu.

Final

Setup menu is displayed. Press **[CLEAR/ZERO]** to return to normal operation or press **[SELECT/F1]** to scroll to a different USER Setup operation.

TOTAL (totAL)

Function

Allows the TOTAL function to be set or disabled. The USER button must be programmed to TOTAL in order to view the current TOTAL value, or to use Manual TOTAL.

Action

1) Hold in the **[F1]** button while turning on the power.
2) Press **[SELECT/F1]** until "totAL" is displayed.
3) Press **[ENTER/TARE]** and the currently selected total mode will flash.
4) Press **[SELECT/F1]** until the desired TOTAL Mode — OFF, PrESS (manual), or AUTO (automatic) is displayed.
5) Press **[ENTER/TARE]** to store, or press **[CLEAR/ZERO]** to exit without changing.

Final

Setup menu is displayed. Press **[CLEAR/ZERO]** to return to normal operation or press **[SELECT/F1]** to scroll to a different USER Setup operation.

SYSTEM INITIALIZE

Caution: Do Not Initialize the scale for routine calibration. System initialize is only needed when the circuit boards are replaced. This procedure should be initiated only by the factory or any authorized service representative.

Function

Clears the internal Calibration settings. Usually used for board replacement, troubleshooting, or load cell replacement. This procedure does not alter factory feature settings.

Action

1) Turn off the scale by pressing the **[POWER]** key.
2) Remove the seal port on the left front panel of the scale. Press the switch button in the hole with a probe, such as a blunt tip screwdriver, and simultaneously press the **[POWER]** key.
3) The scale will prompt the user for confirmation by displaying "SurE?"
4) Pressing **[TARE]** will continue the system initialization. Pressing **[ZERO]** will abort the system initialization without resetting any parameters.

CALIBRATION SETUP

Function

Calibration Setup is used to initiate calibration or to set seldom changed factory settings. There are two types of calibration:
1) Initial Calibration;
2) Subsequent Calibration

Calibration must be accomplished by a qualified scale technician trained in Certified Calibration Standards. To initiate calibration of a Port-A-Weigh, the technician is required to have an accurate test weight system of adequate capacity and, in the case of a Legal For Trade Port-A-Weigh, the test weight system must be certified by the appropriate regulatory agency.

Important Note: At any point (except when entering calibration weight values), the calibration procedure can be halted by turning POWER off.

Action

1) Remove the seal port on the right front panel of the scale. Insert a probe, such as a blunt tip screwdriver, to depress the underlying button. The display will show "C-SEt" for 1 second.

2) The Calibration Setup Menu appears. Press the **[SELECT/F1]** button to scroll through the various Calibration Setup menu choices.

3) Once the desired operation is displayed, press **[ENTER/TARE]**.

Final

To return to normal operation either scroll with the **[SELECT/F1]** button to exit and press **[EN-TER/TARE]**, or press **[CLEAR/ZERO]**.

QUICK CALIBRATION SETUP GUIDE

Note: Display items in bold are defaults.

Top Menu	Selection Display	Display Definition
CAL		Calibration
F-CAL		Fine Calibration
CAL-r		Calibration with Offset Calibration Resistor
StAnd	**IndUS** nISt EuroP 1 Unit	Standards Industry National Institute of Standards & Technology Metric (kg only)/OIML One Unit Only
r-Ctl	On **OFF**	Remote Control
AZM	**On** Off	Automatic ZERO Maintenance

CALIBRATION (CAL)

Function

Used to Calibrate the scale load cell. There are two types of calibration:

1) Initial Calibration and
2) Subsequent Calibration

INITIAL CALIBRATION

Function

Initial Calibration is used at the factory when Calibrating for the first time, when the circuit boards have been replaced or after the scale has gone through System Initialize.

Note: Do not use this procedure for routine Calibration.

Action

1) Press **[SELECT/F1]** until "CAL" appears then press **[ENTER/TARE]**. The following steps will occur:

2) Display flashes right hand lb. indicator while displaying number of lbs. if calibraing in lbs. press **[ENTER/TARE]**, or to select kgs (left hand kg indicator flashes) press **[SELECT/F1]** then **[ENTER/TARE]**.

Note: This step will not occur in scales equipped to measure in only one unit.

3) Display shows "CAP" for 2 seconds then flashes "0". Input the capacity using **[SELECT/F1]** and **[ENTER/TARE]**.
4) Display shows "d" for 2 seconds, then flashes the default Count By (division). Press **[ENTER/TARE]** to accept, or press **[SELECT/F1]** to pick another Count By, then press **[ENTER/TARE]**.
5) Display flashes "GAin4". Press **[ENTER/TARE]** to accept, or press **[SELECT/F1]** to pick another gain, then press **[ENTER/TARE]**. See Gain Table.

Capacity of Scale		Gain	Capacity of Scale		Gain
250 lb	125 kg	4	5,000 lb	2,500 kg	4
500 lb	250 kg	3	10,000 lb	5,000 kg	3
1,000 lb	500 kg	4	15,000 lb	7,500 kg	3
2,000 lb	1,000 kg	3			

Gain Table

6) Display flashes "UnLd". Unload the scale and press **[ENTER/TARE]**. The scale will display "CALC", for calculating.
7) Display shows "LOAd" for 2 seconds then flashes the capacity. Load the scale with a test weight that is equal to capacity weight; or if the test weight is less than capacity, enter the actual weight of the test weight by pressing **[SELECT/F1]** then **[ENTER/TARE]**. After the last number of the weight has been entered and the motion indicator is off press **[ENTER/TARE]**. The display will show "CAL'd" if successful, or "CErr" if not successful. An unsuccessful calibration can be due to an improper gain setting, or use of a calibration weight that is too light.
8) Display flashes "UnLd". Unload the scale and press the **[ENTER/TARE]** button. Afterwards "r-CAL" will be displayed until the value is determined. If successful, then the CAL-r value is displayed for 10 seconds or until any button is pressed. If unsuccessful, the display will show "r-Err" for 2 seconds.

Final

Display shows "StorE" to signify that the calibration parameters are being saved in backup memory. When complete the display will show "F-CAL" for the next menu item. Press **[CLEAR/ZERO]** to return to normal scale operation.

SUBSEQUENT CALIBRATION

Function

Subsequent Calibration is used for routine annual Calibration or when the scale is not weighing accurately.

Action

1) To set ZERO the display flashes "UnLd". Unload the scale and press **[ENTER/TARE]**. The scale will display "CALC" (for calculating).
2) To input the Calibration weight value the display will show "LOAd" for 2 seconds then flash the capacity. Load the scale with this weight or input another weight. After the last number of the weight has been entered and the motion indicator is off, press **[ENTER/TARE]**.

The display will show "CAL'd" if successful, or "CErr" if not successful. An unsuccessful calibration can be due to an improper gain setting, or use of a calibration weight that is too light.

3) To set the CAL-r value the display flashes "UnLd". Unload the scale and press the **[ENTER/ TARE]** button. Afterwards "CAL-r" will be displayed until the value is determined. If successful, then the CAL-r value is displayed for 10 seconds or until any button is pressed. If unsuccessful, the display will show "r-Err" for 2 seconds.

Note: It may be desirable to bypass a calibration step. To do so press **[CLEAR/ZERO]**. The step bypassed will retain the default or last set value. However, bypassing a calibration step may result in an incomplete or inaccurate calibration.

Final

Calibration is complete and the display shows "StorE" to signify that the calibration parameters are being saved in backup memory. When complete the display will show "F-CAL" for the next menu item. Press **[CLEAR/ZERO]** to return to normal scale operation.

FINE CALIBRATION (F-CAL)

Function

Fine Calibration (F-CAL) is for minor adjustments to calibration and is usually not necessary. It is useful, however, in hydraulic calibration fixtures for fine adjustments.

Action

1) Press **[SELECT/F1]** to scroll to the "F-CAL" message. Press **[ENTER/TARE]**.
2) Pick up a test weight of (or set the hydraulic tension to) at least 25% of capacity. The weight is indicated on the numeric digits. The display will flash "LOAd" if the weight is under 25%.

WARNING: Fine Calibration will not function unless the scale is loaded at 25% of capacity or more.

3) Press **[SELECT/F1]** to cause the displayed reading to move up slightly. Press the button **[CLEAR/ZERO]** to cause the reading to move down. Each press of the **[SELECT/F1]** or **[CLEAR/ ZERO]** button causes the calibration to shift by 1/4 displayed count. When the displayed reading is acceptable, press **[ENTER/TARE]**.

Final

Fine Calibration is complete, press **[CLEAR/ZERO]** to return to normal scale operation, or press **[SELECT/F1]** to choose another Calibration Setup function.

CALIBRATION WITH CALIBRATION OFFSET RESISTOR (CAL-r)

Function

Calibration with the Cal Resistor (CAL-r) is for emergency calibration only when test weights or a calibration system are not available.

Action

1) Press **[SELECT/F1]** to scroll to the "CAL-r" message. Press **[ENTER/TARE]**.
2) Display flashes "UnLd". Unload the scale and press **[ENTER/TARE]**. The scale will display "CALC" (for calculating).
3) Display shows "LOAd" for 2 seconds then flashes last set CAL-r value. Input the CAL-r value printed on the load cell Cal Sheet. After the last number has been entered, press

[ENTER/TARE]. The display will show "CAL'd".

4) Display flashes "UnLd". Unload the scale and press **[ENTER/TARE]**. Afterwards CAL-r will be displayed until the value is determined. Then the CAL-r value is displayed for 10 seconds, or until any button is pressed.

Final

Calibration is complete and the display shows "StorE" to signify that the calibration parameters are being saved in backup memory. The calibration menu returns. Press **[CLEAR/ZERO]** to return to normal operation or press **[SELECT/F1]** to scroll to a different Calibration Setup operation.

Note: When Calibration is finished, seal the Calibration Port on the front panel of the scale.

STANDARDS (StAnd)

Function

Facilitates calibration to your required standard:

IndUS	Industrial
nISt	National Institute of Science and Technology (NTEP setting)
EuroP	Metric/OIML
1Unit	One Unit only (for custom scales)

Action

1) Press **[SELECT/F1]** until "StAnd" is displayed.
2) Press **[ENTER/TARE]** and the currently selected standard will flash.
3) Press **[SELECT/F1]** to choose desired standard.
4) Press **[ENTER/TARE]** to store, or press **[CLEAR/ZERO]** to exit without changing.

Final

The calibration menu is displayed. Press **[CLEAR/ZERO]** to return to normal operation or press **[SELECT/F1]** to scroll to a different Calibration Setup operation.

AUTO ZERO MAINTENANCE (AZM)

Function

To enable/disable AZM for certification testing.

Action

1) Press **[SELECT/F1]** until "AZM" is displayed.
2) Press **[ENTER/TARE]** and the currently selected AZM Mode (On/Off) will flash.
3) Press **[SELECT/F1]** to choose the desired AZM Mode (On/Off).
4) Press **[ENTER/TARE]** to store or press **[CLEAR/ZERO]** to exit without changing.

Caution: Disabling Auto Zero Maintenance will degrade temperature and drift performance of the Port-A-Weigh. Disabling the AZM is only intended for certification testing. Under no other circumstances should the scale be used with AZM disabled.

RF REMOTE CONTROL

Description

MSI-4260 crane scale can be equipped with a RF Remote Control (RFRC). The RFRC is a transmit only device that can be used to perform basic scale functions. Range will vary from 25' to 100' depending on room conditions and line of sight to the display. The remote receiving antenna is behind the red lens of the crane scale and best range will occur when the display is visible to the operator using the RFRC. One big advantage the RFRC provides is the ability to turn the unit on remotely.

The RFRC is available in three versions differing only in transmit frequency. The standard version operates at 418MHz. Available alternative frequencies are 315 MHz and 433 MHz.

Functions

The RF Remote control (RFRC) duplicates the function of the front panel keys on MSI-4260 crane scales. The POWER, ZERO, NET/GROSS, and TARE key function identically.

Note: F2, Total (F3) and View Total (F4) on the RFRC are not supported by the Port-A-Weigh. Total and Viewing the Total can be initiated with the F1 key on the RFRC.

The F1 key functions the same as the User Programmable Function (F1) key on the front panel. The exact function of the key depends on the F1 key setup procedure. See page 11 for the procedure to configure the F1 key, which will also configure the F1 key on the remote.

Setting the Transmitter Address

In order to allow the formation of up to 1024 unique Transmitter-Receiver relationships, the transmitter's address may be selected using internal DIP switches as shown. The switches are accessed by removing the DIP-switch access cover.
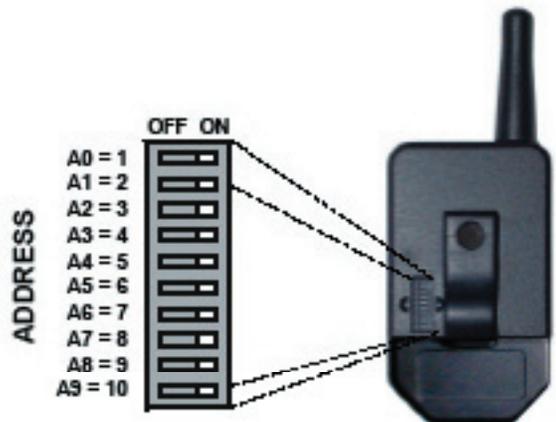
Note: If the switch is on, the address line is connected to ground, otherwise it is floating. The receiver's address must match in order for the units to communicate.

MSI supplies the transmitter and receiver as a matched set with the DIP switches already configured. A replacement RFRC will only need to have the transmitter DIP switches set. To change the DIP switch in the receiver requires disassembly of the crane scale front casting.

Note: Due to different DIP switch styles, the receiver DIP switch appears opposite to that of the transmitter. On the receiver, the OFF position is on the right, and the ON position is on the left.

Contension Considerations

It is important to understand that only one transmitter at a time can be activated within a reception area. While the transmitted signal consists of encoded digital data, only one carrier

of any frequency can occupy airspace without contention at any given time.

Battery Replacement

The remote unit utilizes a CR-2032 Button Lithium Cell. In normal use it will provide 1-2 years of operation. Access for replacement is accomplished by removing the battery access cover by pressing down firmly on the label area and sliding it off. Once the unit is open, remove the battery by sliding it from beneath the holder. Replace the cell with the same type while observing the polarity shown.

RF Remote Control FCC Statement

Instruction to the User

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: Reorient or relocate the receiving antenna. Increase the separation between the equipment and receiver. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. Consult the dealer or an experienced radio/TV technician for help.

This Equipment has been certified to comply with the limits for a Class B computing device, pursuant to FCC Rules. In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

TROUBLESHOOTING GUIDE

Problem	Possible Cause	Solution
1. Display is blank when POWER button is depressed	A) Discharged battery B) Defective battery C) Corroded battery D) Defective button or electronic circuit board E) Power button not properly depressed	Recharge Replace Clean connections Requires authorized service Press POWER firmly and hold until Power turns on.
2. Display does not function properly or front panel buttons do not function normally or scale will not turn off	A) Computer lock-up B) Faulty electronic circuit board C) Faulty front button assembly	Remove and re-insert battery. If problem persists, authorized service is required Requires authorized service Requires authorized service
3. Display does not respond to weight changes	A) Same as 2A, B above B) Out of calibration C) Faulty load cell or electronic circuit board D) Load cell disconnected from printed circuit board	See 2A, B above Check calibration Requires authorized service Plug in
4. Display over-ranges below 100% of capacity	A) Tared out weight is added to load when overload condition is determined B) Zero requires adjustment C) Out of Zero range	Normal (See Operation Guide) Recalibrate Remove dead load and re-zero
5. Display experiences excessive Zero drift between weighments	A) AZM turned off B) Scale electronics do not stabilize after turning on (probably due to rapid temperature change)	Go into Cal menu and turn AZM on Warm up scale for 5 minutes then re-Zero
6. Display shows large number after Power-up sequence with AZM feature Off, and no applied weight	A) ZERO requires adjustment B) Defective load cell or electronic circuit board	Follow Calibration Section Requires authorized service
7. Displayed weight shows large error	A) Scale not Zeroed before applying weight B) Requires recalibration	Depress ZERO before applying weight See Calibration

Problem	Possible Cause	Solution
	C) lb/kg in wrong selection	Set to correct selection
8. Display reading not stable	A) Filter set too low B) Faulty electronic circuit board	Change filter setting Requires authorized service
9. Battery charger indicator does not come on when discharged battery is inserted	A) Corroded battery connections B) Defective charger C) Defective battery	Clean connections Requires authorized service Replace
10. Display is "LCnt1" and/or "LCnt2" at Power on	A) Service Counter exceeded	Inspect load train and contact factory
11. Display toggles between "Error" and "A2dLo" or "A2dHi"	A) Broken wire or improper connection B) Unit mis-calibrated C) Load cell damaged	Check load cell wiring for connectivity Re-calibrate with Initial Calibration Replace load cell
12. Display toggles between "Error" and "buttn"	A) A button is being depressed, or button is stuck	Release button or contact factory
13. Display toggles between "Error" and "LOAd"	A) Current weight is greater than rated capacity B) Load cell damaged C) Defective electronics D) Broken wire or improper load cell wiring	Remove excess weight Replace load cell Contact qualified service technician Check Load Cell connection wiring

SERVICE COUNTER WARNING

Function

A Warning is reported at Power On if:
Capacity of the scale has been exceeded more than 1,000 times or a weight in excess of 25% of capacity has been detected more than 100,000 times. This warning informs the operator that the load train should be inspected by a qualified technician.

Action

If a weight in excess of 25% of capacity has been detected more than 100,000 times, then "LCnt2" (Load Counter #2) is displayed, followed by the flashing numeric value. To continue with Power On, press any button.

Final

Power On sequence continues.

Note: If Service Counter Warning has not been reset, it will be displayed the next time POWER is turned on, with the updated numeric values.

MSI LIMITED WARRANTY

MEASUREMENT SYSTEMS INTERNATIONAL, INC., WARRANTS load sensing elements and electronics against defects in workmanship and materials for a period of one year from date of purchase and warrants electrical cables and batteries against the same defects for a period of ninety (90) days from date of purchase.

Any device which proves defective during the warranty period will be replaced or repaired at no charge; provided that the defective device is returned to the Company freight prepaid.

In no event shall the Company be liable for the cost of any repairs or alterations made by others except those repairs or alterations made with its specific written consent, nor shall the Company be liable for any damages or delays whether caused by defective workmanship, materials or otherwise.

The Company shall not be liable for any personal injury or property damage resulting from the handling, possession or use of the equipment by the customer.

The warranty set forth herein is exclusive and is expressly in lieu of all other warranties, express or implied, including without limitation any implied warranties of merchantability or fitness, or of any other obligations or liability on the part of the Company.

The liability of the Company under this warranty is limited solely to repairing or replacing its products during the warranty periods; and the final judgement and disposition of all claims will be made by MEASUREMENT SYSTEMS INTERNATIONAL, INC.

PROPER LOADING PROCEDURES

DO NOT INTERFACE HARDWARE (SHACKLES, HOOKS ETC.) THAT ARE OVERSIZED AND RESTRICT SINGLE POINT LOADING AND SELF-ALIGNMENT WHICH CAN RESULT IN OFF-AXIS LOADING.

DO NOT USE MULTIPLE ATTACHMENTS.

1. DO NOT PUSH OR PULL ON A LOADED SCALE. 2. DO NOT PULL LATERALLY ON HOOK WITH SCALE LOADED.

USE HARDWARE THAT CREATES SINGLE POINT ATTACHMENTS AND ALLOWS THE SCALE FREEDOM OF ALIGNMENT.

"We weigh quality first"

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