MSI3460

Challenger 3 Crane Scales

User Guide

Measurement Systems International

TABLE OF CONTENTS

SECTION 1 – INTRODUCTION & ORIENTATION

INTRODUCTION

The MSI-3460 Challenger 3 is a combination of the sound and proven mechanical design of the industry standard Challenger with today's most advanced electronics to provide a superb feature set unmatched by any scale in its class or price range. The multi-purpose hanging scale is ideal for situations in which headroom is at a minimum. The Challenger 3 is versatile, reliable, accurate and easy to operate. The MSI-3460 is designed to meet or exceed the requirements of all regulatory agencies. RF Remote Control (available now) and Remote Display options (available 2011) are available to further enhance the safety and usability of the Challenger 3.

MSI-3460 FRONT PANEL

KEY DESCRIPTIONS

The **POWER** key turns the MSI-3460 On and Off.

The **ZERO** key is used to zero out residual weight on the scale.

The **TARE** key is used to zero out the weight of containers, trucks, or carriers and to place the scale in the Net weight mode. The **TARE** key functions Tare In, Tare Out. To see the gross weight without resetting the Tare value, you must program the **USER** key as NET/GROSS.

The **USER** key is programmable to user selectable functions. These are described in the USER Key Setup section. This key is defaulted to the TEST function.

GENERAL INFORMATION

USER GUIDE & MSI-3460 CONVENTIONS

1) Keys used in operations are printed in **BLUE** and capitalized.
2) Screen shots that are used in menus are displayed in **RED** and shown in a 7-segment font. Not all characters are displayable with this font, but a close approximation is shown.
3) If a function key does not work, it is probably because the MSI-3460 is not setup to support the key. For example, if the Function key is set for TOTAL, you must also setup the TOTAL mode in the Setup Menu.
4) When in Setup Menus, the **ZERO** key drops back one menu level. At the root menu level, the **ZERO** key stores the changes and returns to the weight mode.
5) When in Setup Menus, the **POWER** key returns you directly to the Weight Display without storing the changes.
6) When in Setup Menus, the **USER** key functions as the scroll key.
7) When in Setup Menus, the **TARE** key functions as the ENTER/SELECT key.

3460 ANNUNCIATORS

The MSI-3460 uses blue and red LEDs to indicate weight mode and other information

MOTION	The motion annunciator (Blue LED) indicates that the weight has not settled within the motion window (usually ±1d). While this symbol is illuminated, the scale will not zero, tare, or totalize.
→O←	Center-of-Zero – (Blue LED) Indicates the weight is within 1/4d of zero.
PEAK	PEAK – (Blue LED) Indicates the scale is in the peak hold mode.
NET	NET – (Blue LED) Indicates the scale is in the Net weight mode. A Tare weight is subtracted from the gross weight.
GROSS	GROSS – (Blue LED) Indicates the scale is in the Gross weight mode. All hook weight is displayed minus any zero offset.
TOTAL	TOTAL – (Blue LED) Indicates the scale is displaying the Total weight. This is a temporary display lasting less than 5 seconds.
X1000	X1000 – (Blue LED) Usually used in conjunction with the TOTAL Led to allow accumulation of weight beyond the 5-Digit display capacity.
LO BATT	LO BATT – Appears when approximately 10% of battery life remains. This LED blinks when automatic shut-down is eminent.
kg	kg – (Red LED) Indicates weight display is in kilograms.
lb	lb – (Red LED) Indicates weight display is in pounds.
SET POINTS	SET POINTS – User programmable set points for early overload warnings. Set Point 1 and 2 are Blue LEDs and Set Point 3 is a Red LED.
ACK	ACK – The Acknowledge LEDs are used to provide feedback to the operator that incoming remote commands have been received (Blue LED) and once executed, then the Red LEDs light briefly. Also used for acknowledging succesfull Auto-Total operations
RF	RF – (Blue LED) Indicates carrier detect for RF Remote Display equipped MSI-3460. If the LED is illuminated, 3460 and remote display are linked. On units equipped with the RF Remote Control, the LED is illuminated when a remote command is received and for the next half second.

SPECIFICATIONS

Accuracy:	±(0.1% +1d). 'd' equals one displayable increment.
Resolution:	Standard displayed resolution: 2500-3750 'd' . Resolutions to 10000 'd' (non LFT units only) are possible. Internal A/D resolution: 24 bits
Standard Capacities:	**lb** 250 500 1000 2000 5000 10,000 15,000 **kg** 125 250 500 1000 2500 5000 7500
Power:	Battery operated, 6V rechargeable sealed lead acid battery pack (standard Challenger Charger) Up to 100 hours of battery life with Automatic Sleep Mode and Automatic Power Off
Display:	5 digit, large 1.5 in (38 mm) numeric red GaAIAs Light Emitting Diode (LED)
Operating Temp:	- 40°F to +122°F (-40°C to +50°C), LFT range -10°C to +40°C.
Operating Time:	50 hours typical/100 hours max. (depends on operating mode)
Enclosure:	NEMA 4/IP65 powder coated alodined cast aluminum
Load Cell:	Standard 350 Ω Bridge, S-Beam
USER:	Programmable multifunction button for use as TEST, TOTAL, UNIT, PEAK, NET/GROSS, VIEW TOTAL, and LEARN (for RF Remote Control)
CAL:	Front panel calibration switch (located behind wire sealable screw). Initiates full digital calibration procedure
Auto Zero Maintenance:	Standard, can be disabled internally
Auto-Off Mode:	Prolongs battery life by turning POWER off after 15, 30, 45, or 60 minutes (operator determined) of no scale activity
Auto-Sleep Mode:	Prolongs battery life by dimming LED display after 5, 15, or 30 minutes of no activity
Units:	kg, lb (other Units available with custom calibrations)
Filtering:	Selectable: OFF, 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, (>600 readings per second)
Set Points:	Three internal standard Set Points and three ultrabright LEDs on indicator panel
Service Counter:	Two independent 32 bit registers; Register 1 updated each time weight exceeds 25% of capacity; Register 2 updated each time weight exceeds overload; when register 1 exceeds 16383 or register 2 exceeds 1023, display reads "LCnt" for load cell counter; Test function shows the two readings in order
Construction:	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 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.
OPTIONS:	
Wireless Remote Controller:	50' (15m) typical range Line-of-Sight. Uses 418MHz (USA) handheld transmitter. 315MHz and 433MHz options are available for international applications.
Wireless Remote Display: (available 2nd quarter 2011)	50' (15m) typical range Line-of-Sight. Uses 802.15.4, 2.4GHz handheld transceiver

The MSI-3460 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 all US and international standards.
- Up to 100 hours of weighing time utilizing Automatic Sleep Mode.
- Automatic Power Off conserves battery life by sensing no activity after 15, 30, 45 or 60 minutes, determined by operator, and turns Power off.
- Automatic Sleep Mode preserves battery life by dimming the LED display after 5,15, or 30 minutes of no activity.
- Rugged construction throughout. Buttons are sealed and rated for over 1 million operations.
- Precise high resolution (2500 division standard and up to 10,000 possible) 24 bit A/D conversion coupled with advanced RISC microcontroller provides world class features and accuracy.
- Five large, 1.5 inch (38mm) LED digits for clear weight readings from a distance.
- Easy to maintain: Full digital calibration assures reliable, repeatable measurements. Can be calibrated without test weights using MSI R-Cal technology,
- Selectable for kg / lb. *unless prohibited by LFT regulations*.
- Automatic or manual weight totalization for loading operations.
- Easily customized for special applications.
- Hi speed PEAK Mode for wire and rope stress analysis.
- Three Set Points can be set for any in-range weight for operator alerts or process control.
- ScaleCore Technology providing quick and easy software updates and calibration / setup backup.
- 2 Service counters ensure Load Train safety by warning the user to perform a Load Train safety check when the lift count gets high or the scale has been overloaded repeatedly.

OPTIONS

Options which you may have ordered with your Challenger 3 may include the following:

- RF Remote Controller.
- RF Remote Display
- 85-265 VAC input power.
- Audible Alarm (triggered by Set Point 1)

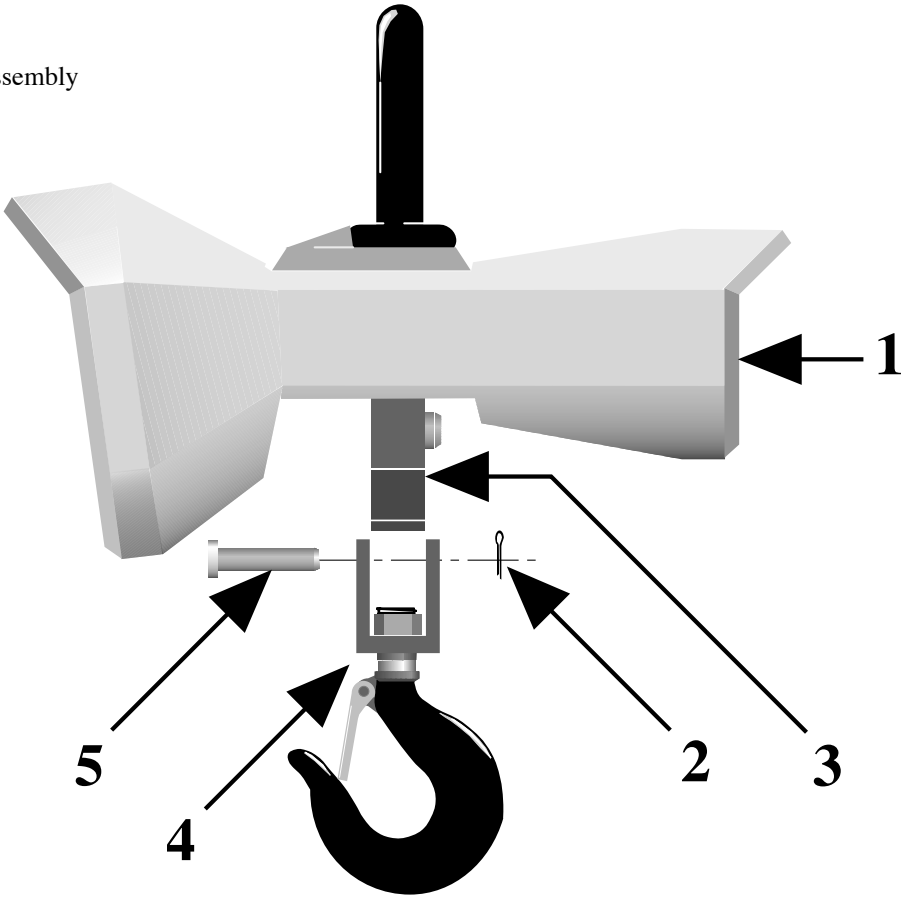
UNPACKING

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 Challenger 3.

ASSEMBLY

Identify and locate the following (see MSI-3460 assembly parts drawing):

1. Battery pack
2. Cotter pin
3. Load cell
4. Hook clevis assembly
5. Clevis pin



1) Slide hook clevis over load cell with open end of hook toward front of scale.
2) Align holes of clevis and load cell.
3) Slide the clevis pin through the clevis and load cell holes.
4) Lock clevis pin in place with cotter pin. Bend cotter pin.

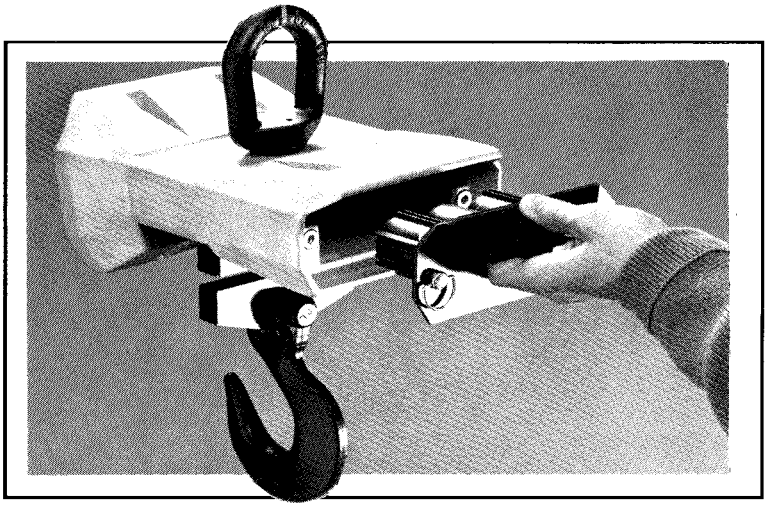
WARNING: Scale will be unsafe for use if clevis pin is not properly secured with the cotter pin.

5) Slide battery pack into battery compartment. The battery will automatically engage with its connectors.
6) Secure battery pack by turning the two locking fasteners on access door clockwise 1/4 turn.
7) The scale is now ready for use.

BATTERY PACK

The Challenger 3 is powered by a 6 volt rechargeable battery. The battery is permanently attached to the battery door.

To remove the battery pack, turn the two fasteners on the access door counterclockwise 1/4 turn, then pull the battery pack straight out. The battery will automatically disengage from its connectors.



The battery will operate for up to 100 hours (depending on LED brightness setting) before requiring recharging. In order to conserve battery life, the scale includes an Automatic Power Off Mode which senses operational status for no activity after 15, 30, 45, or 60 minutes, and turns the scale off. An additional battery saving feature is the Automatic Sleep Mode. This feature preserves battery life by dimming the display after 5, 15, or 30 minutes of no scale activity. Charging time for a completely discharged battery is up to 8 hours. A spare battery pack is recommended to keep the Challenger 3 in continuous operation.

Note: To obtain maximum service life from your batteries they should be stored between -4°F and 122°F (-20°C and +50°C). Stored batteries should be recharged every three months. Battery is fully charged when the status indicator is flashing.

BATTERY CHARGER

1) Remove the battery from the scale.
2) Plug battery charger into an AC power receptacle. The input voltage is universal from 90VAC to 264VAC, 50/60 Hz. If the power input plug doesn't match, contact MSI for information on international plugs.
3) Slide the battery charger connector plate over the top of the battery until the battery terminals mate with the charger connectors, as seen through the two observation holes.
4) Approximately 6-8 hours is required to recharge a fully discharged battery. If a battery was deep discharged, more time might be required, but the MSI-3460 prevents deep discharging. Partially discharged batteries will finish the charge faster.

The charger is a 3 stage float charger that can be left on the battery indefinitely. It has a dual color LED to indicate the charging state: RED – Fast Charge Mode. GREEN – Charged or Float Charge.

Shown is the charger and battery assemblies.

Note that a second battery is recommended to enable you to use your scale continuously.

Keep one on the charger while the other is in service.

Note: To obtain maximum service life from your batteries, the manufacturer suggests recharging after each 20 hours of use. Continuous deep discharging will reduce maximum battery life cycle estimated at 2000 cycles.

SECTION 2 – SCALE OPERATION

POWER

To Turn On the Power

1) Press the **POWER** key.
2) The LED will light all segments for a display test.
3) The Software Version number will display.
4) The scale is ready for use.

ZERO

Sets the zero reading of the scale. Use the **ZERO** key to take out small deviations in zero when the scale is unloaded. (See "TARE " for zeroing (Taring) package or pallet weights)

To Zero

1) Press **ZERO**. The weight reading must be stable within the motion window for the zero function to work. The scale digits display 0 (or 0.0 or 0.00, etc.). The backup memory in the MSI-3460 stores the zero reading, and can restore it even if power fails.

Zero – Rules for Use:

1) Works in GROSS mode or NET mode. Zeroing while in Net mode will zero the gross weight causing the display to show the negative Tare value.
2) The scale must be stable within the Motion window. The scale will not zero if the motion detect annunciator is on. The Scale will "remember" that it has a zero request for 2 seconds. If motion clears in that time, the scale will zero.
3) The scale will accept a zero setting over the full Range of the scale (NTEP and other Legal-for-trade models may have a limited zero range). Zero settings above 4% of full scale will subtract from the overall capacity of the scale. For example if you zero out 100 lb. on a 1000 lb. scale the overall capacity of the scale will reduce to 900 lb. plus the allowed over-range amount.

TARE

Tare is typically used to zero out a known weight such as a packing container or pallet and display the load in NET weight. A Tare value is entered by pressing the **TARE** key. The TARE function in the MSI-3460 is defined as a Tare-In, Tare-Out operation. The first press of the **TARE** key stores the current weight as a tare value and then the scale subtracts the tare value from the gross weight and changes the display to NET mode. The next press of the **TARE** key will clear the Tare value and revert the display to GROSS mode.

To view the Gross weight without clearing the Tare Value, program the **USER** key to the function "NET/GROSS". The RF Remote Control has a Net/Gross key permanently available.

To Tare and display the Net Weight

Press **TARE**. The weight reading must be stable within the motion window for the tare function to work. The scale digits display 0 (or 0.0 or 0.00, etc.) and the weight mode changes to NET. The backup memory in the MSI-3460 stores the tare reading, and can restore it even if power fails.

To Clear the Tare and revert to Gross Weight

Press **TARE**. The Net annunciator will turn off and the Gross annunciator will turn on.

Tare – Rules for Use:

1) Only positive gross weight readings can be tared.
2) The motion annunciator must be off. The weight reading must be stable.
3) Setting or changing the tare has no effect on the Gross zero setting.
4) Taring will reduce the apparent over range of the scale. For example, taring a 100 lb. container on a 1000 lb. scale, the scale will overload at a net weight of 900 lb. (1000-100) plus any additional allowed overload (usually ~4% or 9d).
5) The scale stores the Tare value in non-volatile memory and is restored when power is cycled.

SECTION 3 – USER KEY FUNCTIONS

The following function descriptions are for optional user defined functions that are programmed on the front panel USER key or the two function keys (F1 F2) on the RF Remote Control. The functions TOTAL, VIEW TOTAL, and NET/GROSS are available full time on the RF Remote Control. To enable any of the USER key functions, you must set up the USER keys following the procedures in Section 5.

TEST

The TEST function provides an LED test that lights all LEDs at once and then counts from 00000 to 99999. Other internal tests are performed and if any test fails, an Error Code will display. See Appendix A for a description of all error codes.

TOTAL

Note: The Total Mode must be programmed from the Setup Menus before the USER key will 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 four Modes of totalizing: Manual and three Auto Modes. 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. This assures that a weight on the scale is only added to the total once. Both the manual and three auto total modes require that the weight on the scale return below 0.5% (relative to full scale) of GROSS ZERO or NET ZERO before the next weighment can be added. Applied weight must be ≥1% of full scale above GROSS ZERO or NET ZERO before it can be totaled.

MANUAL TOTAL

The USER key under the MANUAL TOTAL mode functions in this manner:

Weight is > 1% of Capacity and has not been totaled – Pushing the USER key will add the current weight to the TOTAL weight. The ACK LED's blink to indicate the weight was accepted. The TOTAL annunciator lights and the Total weight is displayed for ~5 seconds and then the number of samples is displayed for ~2 seconds.

Current Weight has been Totaled – Pushing the USER key will display the Total weight for 5 seconds (View Total) without changing the Total value. The TOTAL annunciator will light during the TOTAL weight display. After 5 seconds of Total Weight display, the number of samples is displayed for ~2 seconds.

Weight is <1% of Capacity – The USER key functions as "View Total" only and functions as View Total until the 1% threshold is exceeded to allow the next addition to the total value.

AUTO TOTAL

The USER key under the AUTO TOTAL mode functions as Auto Total On / Auto Total Off:

The Auto Mode has three variations which are programmed in the SETUP menu:

[1] AutoLoad – Any settled weight above the 'Rise above' threshold will be automatically totaled. Then the scale must fall below the 'Drop below' threshold before another total is allowed.

[2] AutoNorm – This mode takes the last settled weight to auto total with. The total occurs only once the scale goes below the threshold. This allows the load to be adjusted without a total occurring. Once the load is removed, the scale uses the last settled reading for total.

[3] AutoHigh – Similar to the AutoNorm mode except the scale uses the highest settled reading. Useful for loads that can't be removed all at once.

VIEW TOTAL

The Function key activates the Total weight display followed by the number of samples. While the display is showing the Total, Total is cleared by pressing **ZERO**.

NET / GROSS

Switches the display between Net and Gross modes. Net Weight is defined as Gross Weight minus a Tare Weight.

To Switch Between Net Mode and Gross Mode press the **USER** key (Setup to the Net/Gross function).

The **NET/GROSS** key will only function if a Tare value has been established.

Switching back to Gross mode from Net mode will not clear the Tare value. This allows the operator to use the Gross Mode temporarily without having to reestablish the Tare value. Only clearing the Tare or setting a new Tare will change the tare value held before switching into Gross Mode.

OIML Legal-for-Trade (LFT) units only: The NET/GROSS key is temporary action only. The Gross weight is displayed for 2 seconds and then the display returns to the Net Mode. The only way to return to permanent Gross readings is to clear the Tare (see Clear Tare procedure).

PRINT

If print option is installed this menu choice will appear. The setup of the print function is covered in the Option manual.

LEARN

Used for programming the RF Remote Control. This function is detailed in the Remote Control Section.

PEAK HOLD

Peak Hold will only update the display when a higher peak weight reading is established. The Peak Hold function uses a high speed mode of the A/D converter allowing it to capture transient weights at a far higher rate than typical scales. Peak hold is cleared and reenabled with the USER key.

PEAK HOLD is not available on NTEP or OIML LFT certified scales.

UNIT

The Function key will switch the weight units between pounds and kilograms.

UNIT is not available on OIML certified LFT scales.

SECTION 4 – SCALE SETUP

MENU MAP

With the Power off, hold down the USER key, then turn the Power on.
Or press POWER and USER simultaneously

F USER

POWER

SETUP MENU

- Function User Key 1 (Func 1)
- Function User Key 2 (Func2) — *F2 is only on the RF Remote*
- Auto Off Time (A-OFF)
- Sleep Mode (SLEEP)
- Display Intensity (diSPL)
- Set Point 1 (StPt 1)
- Set Point 2 (StPt2)
- Set Point 3 (StPt3)
- Total Mode (totAL)
- **Weight Filter (FiLtr)
- ***Weight Units (Unit)

F USER

USER KEY FUNCTIONS

Off	OFF
Test Display *(default)*	tESt
*Total	totAL
*View Total	u-ttL
*Net/Gross	nEtGr
Remote Learn	LEArn
**Units	P-HLd
***Peak Hold	Unit

AUTO OFF TIME

OFF	Disabled *(default)*
15	15 minutes
30	30 minutes
45	45 minutes
60	1 hour

SLEEP DELAY

OFF	Off, Sleep disabled
5	5 Minutes *(default)*
15	15 Minutes
30	30 Minutes

LED DISPLAY INTENSITY

Auto	Auto by Light Sensor *(default)*
Lo-1	Dim *(longest battery life)*
Lo-2	Medium Dim
Hi-1	Medium Bright
Hi-2	Maximum Bright

Number Entry

OFF	Set Point Off *(default)*
GrEAt	Greater Than
LESS	Less Than

kg lb

TOTAL MODE

OFF	Total Off *(default)*
ttLOn	Total On Manual — *Totals by pressing the USER key*
ALoAd	Autotal on Load — *Totals on first stable load*
ALASt	Autotal Last — *Totals the last stable load before zero return*
AHiGh	Autotal on High Load — *Totals the highest stable load*

Autotal Last and Autotal High total when the scale is unloaded.

SOFTWARE FILTER

OFF	OFF (disabled)
Lo	Low *(default)*
Hi-1	High Filter
Hi-2	Very High Filter

* *Function always available on the RF Remote*
** *Function not available or non-functional in OIML R76 & 1Unit modes*
*** *Function not available or non-functional in OIML R76 or NTEP HB44 modes*

POWER — EXIT and Cancel Changes

ZERO — EXIT and SAVE

TARE — ENTER / SELECT

F USER — SCROLLs through Menu Choices

Go to Index

FUNCTION KEYS

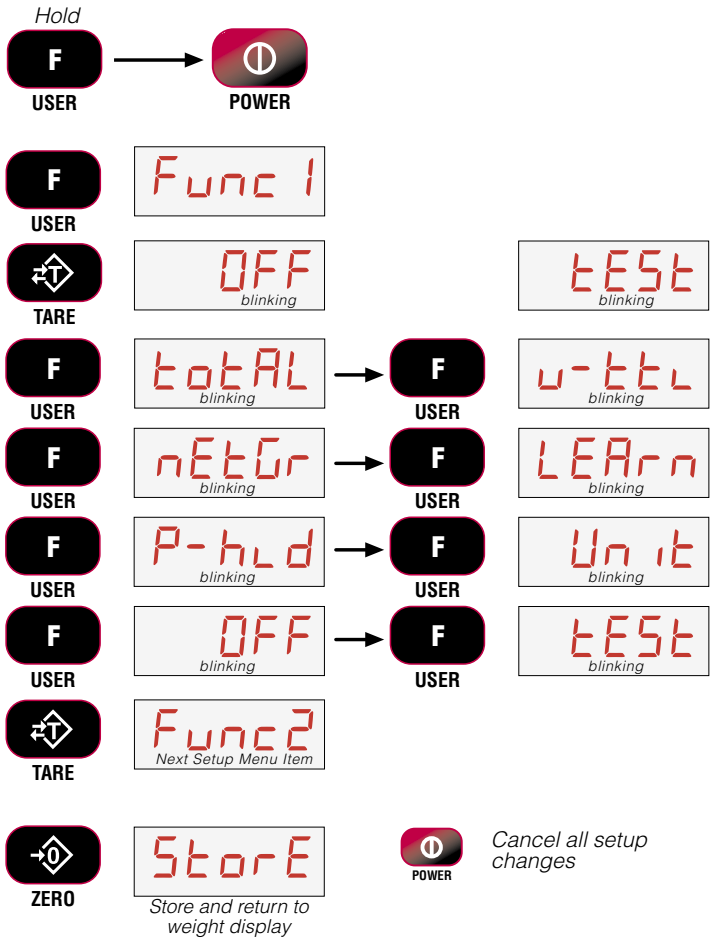
The MSI-3460 has 1 user definable function key on the Front Panel, and an additional user definable function Function key on the RF Remote Control that can be programmed to any of several functions:

Function Key Setup

1) With the 3460 off, press and hold the **USER** key, then press the **POWER** key.
   ...or while the 3460 is on, press USER and POWER simultaneously.
2) The first item of the Setup Menu is “Func1”.
3) To setup the User key press **TARE**. The current User key function is displayed.
4) Select the User key function by scrolling through the choices with the **USER** key. See the list of available functions on the Setup Menu Map.

   This procedure scrolls through all available choices for illustration purposes only.

   In this example, we’ll set F1 to the TEST function.
5) When the desired User Key function is displayed, press **TARE**. The next item in the Setup Menu appears.
6) Either press **ZERO** to exit Setup and store all changes, or continue to another Setup Menu item using the **USER** Key.

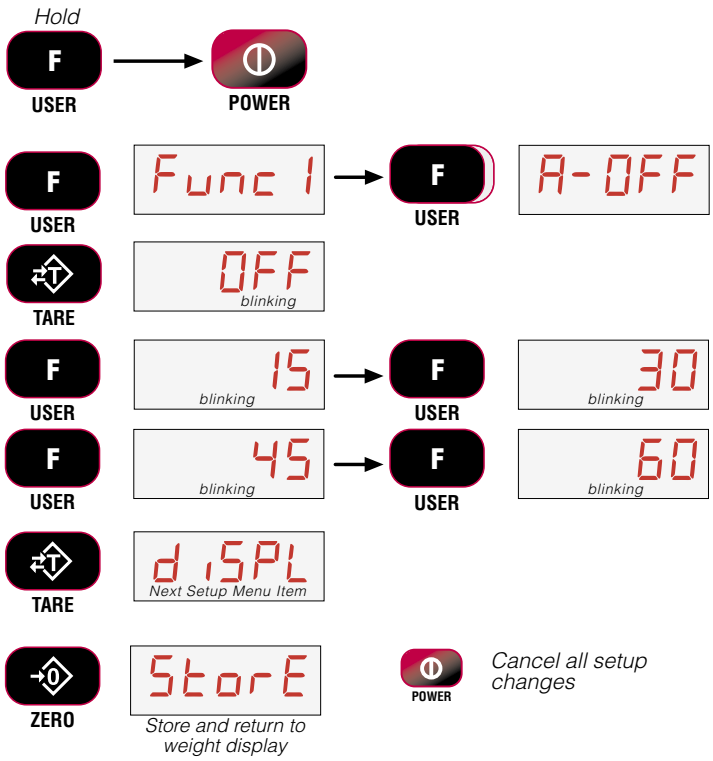


AUTO-OFF

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 exceeding 5 or 10d, 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 (or if the battery is depleted).

Auto-Off Setup

1) With the 3460 off, press and hold the **USER** key, then press the **POWER** key.
   ...or while the 3460 is on, press USER and POWER simultaneously.
2) The first item of the Setup Menu is "Func1". Scroll to "A-OFF" with the **USER** key.
3) To setup the A-Off timing, press **TARE**. The current Auto-Off time is displayed.
4) Select the Auto Off time by scrolling through the choices with the **USER** key.
   In this example, we'll set 60 minutes as the Auto-Off time.
5) When the desired time is displayed, press **TARE**. The next item in the Setup Menu appears.
6) Either press **ZERO** to exit Setup and store all changes, or continue to another Setup Menu item using the **USER** Key.



SLEEP

The SLEEP feature reduces power consumption by automatically dimming the display during periods of inactivity. To wake up either a button must be pushed (front panel or RF remote), or the weight must change by 5 d or more.

SLEEP must be set to less time than the AUTO-OFF timer. For example, set SLEEP to 5 minutes and Auto-Off to 30 minutes.

Sleep Setup

1) With the 3460 off, press and hold the **USER** key, then press the **POWER** key.

   ...or while the 3460 is on, press USER and POWER simultaneously.

2) The first item of the Setup Menu is “Func1”. Scroll to “Sleep” with the **USER** key.

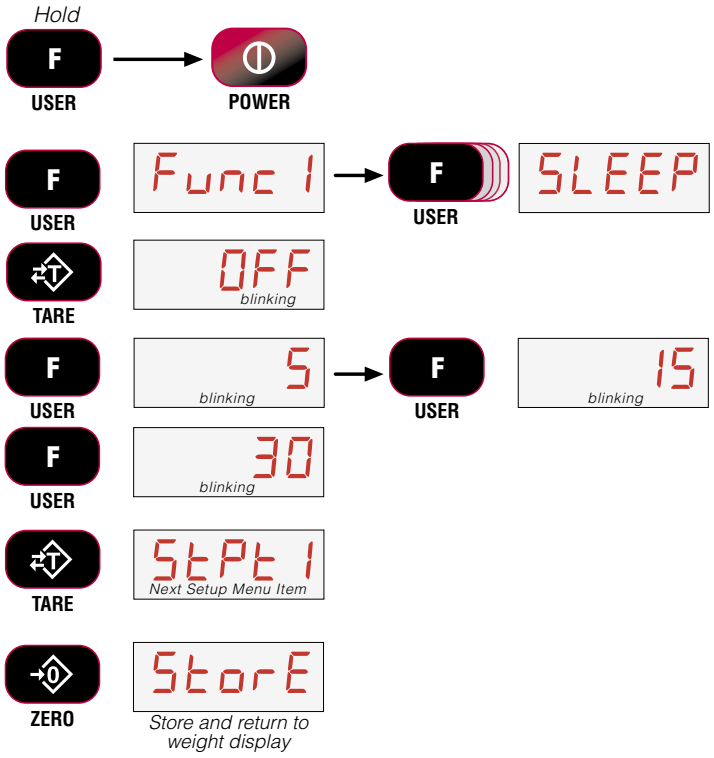
3) To setup the Sleep timing, press **TARE**. The current Auto-Off time is displayed.

4) Select the Sleep start time by scrolling through the choices with the **USER** key.

   In this example, we'll set 30 minutes as the Sleep start time.

5) When the desired time is displayed, press **TARE**. The next item in the Setup Menu appears.

6) Either press **ZERO** to exit Setup and store all changes, or continue to another Setup Menu item using the **USER** Key.



DISPLAY BRIGHTNESS

The Display Setup menu is used to set the display brightness. There are four fixed brightness settings, and one automatic light sensing brightness setting. The Auto setting will automatically detect the ambient light and adjust the brightness of the display accordingly. Bright light will cause the display to be at the brightest setting. The display brightness will reduce as ambient light reduces. The four fixed brightness settings, LO-1, LO-2, HI-1, and HI-2 change the average current in the display. Lower settings increase battery life.

Display Brightness Setup

1) With the 3460 off, press and hold the **USER** key, then press the **POWER** key.

   ...or while the 3460 is on, press USER and POWER simultaneously.

2) The first item of the Setup Menu is “Func1”. Scroll to “diSPL” with the **USER** key.

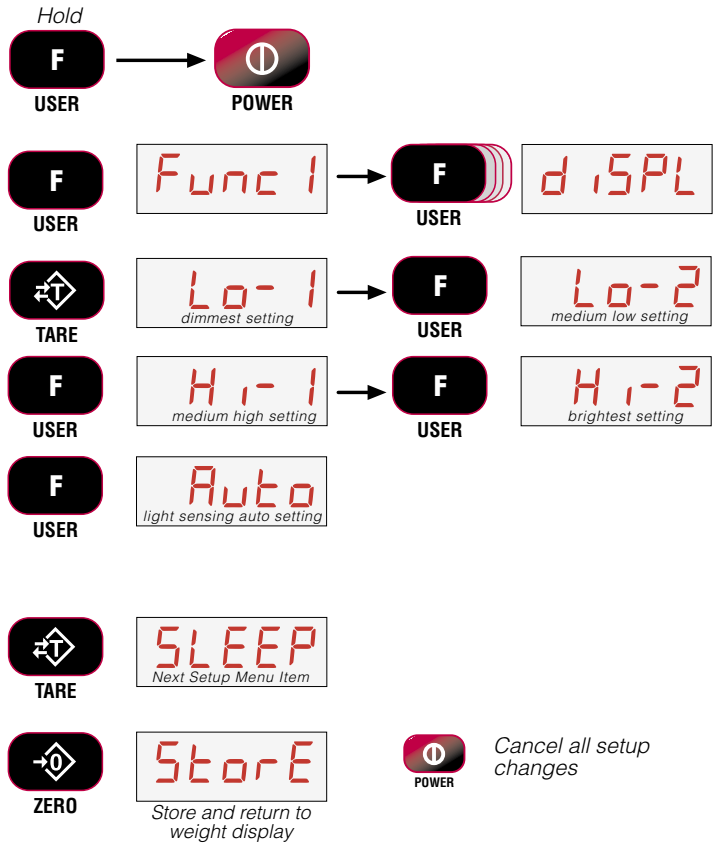
3) To setup the Display brightness, press **TARE**. The current brightness setting is displayed.

4) Select the display brightness by scrolling through the choices with the **USER** key. The menu brightness changes as you scroll through the choices.

   In this example, we’ll set the brightness to the AUTO, light sensing brightness control.

5) When the desired display brightness setting is displayed, press **TARE**. The next item in the Setup Menu appears.

6) Either press **ZERO** to exit Setup and store all changes, or continue to another Setup Menu item using the **USER** Key.



Go to Index

SET POINTS

The 3460 supports three set points. Common uses of set points are for warnings or process control. The 3460 comes standard with LED outputs for a triggered set point. Set Point 1 and 2 are Blue LEDs and Set Point 3 is Red. The 3460 has an audible output option that is triggered by Set Point 1. Contact MSI for other Set Point Output Options.

Set Point Setup

1) With the 3460 Off, press and hold the **USER** key, then press the **POWER** key.
   ...or while the 3460 is on, press USER and POWER simultaneously.

2) Scroll through the Setup Menu choices by pressing the **USER** key. Stop when the LED displays "StPt1", "StPt2", or "StPt3".

3) When the desired Set Point is displayed, press **TARE**. The display blinks "OFF", or if previously programmed, the last set mode.

4) Select the Set Point mode by scrolling through the choices with the **USER** key. "GrEAt" (greater than) indicates the Set Point will trigger when the weight exceeds the value. "LESS" (less than) will trigger the set point when the weight is less than the value. *This example scrolled through all available choices for illustration purposes only.*

5) When the desired Set Point Mode is displayed, press **TARE**. *If there was a previous value, it is displayed. If no value has been entered, a zero will appear. To keep the displayed value, press ZERO.*

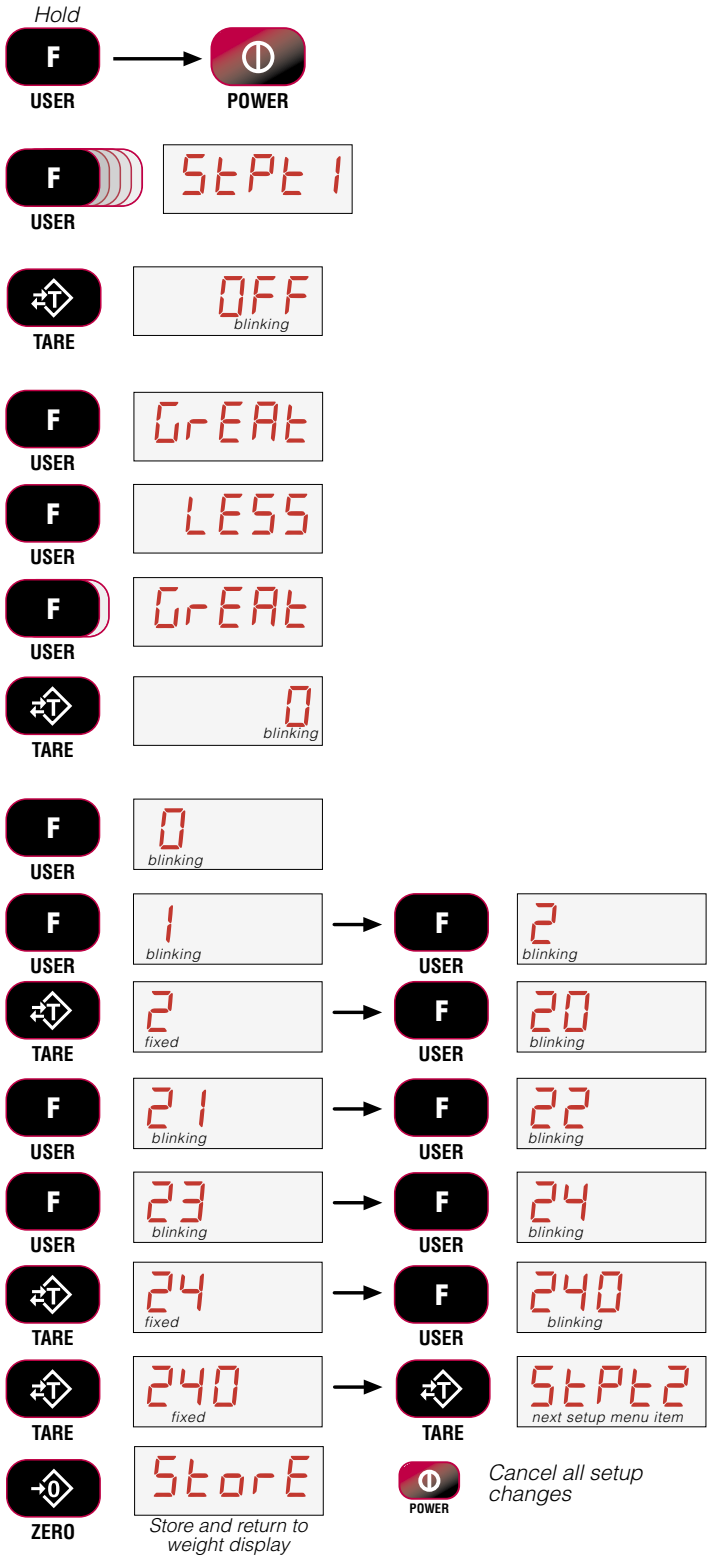
6) Press the **USER** key. The first digit blinks at zero. Use the **USER** key to scroll through the numbers. When the desired number is shown, push **TARE**. *In this example, we'll enter 240 as a Set Point value.*

   To enter a decimal point, push POWER while the digit is blinking.

   Error Correction: If you input a wrong value, press ZERO to step back one digit and change the digit with the USER key.

7) When the desired number is shown, push **TARE** a second time to set the value. The next Setup Menu item is displayed.

8) Either press **ZERO** to exit Setup and store all changes, or continue to another Setup Menu item using the **USER** Key.

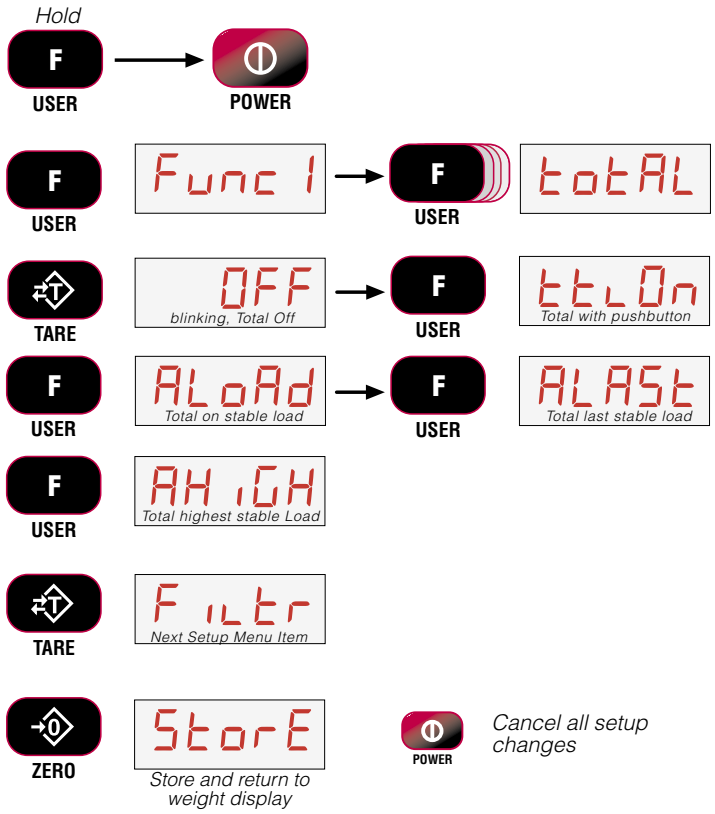


TOTAL MODE

The 3460 can keep track of all weighments using the Total feature. Either manual total, which totals by pushing a configured USER key on the front panel or the RF Remote, or Auto-Total. which can be used to automatically add up each weighment. See the Total mode descriptions for details on the various Total modes. To use Manual Total, you must also program a User Key. Auto Total modes do not need a user key, but if a User key is setup for Total, then it will function as a total on / total off.

Total Mode Setup

1) With the 3460 off, press and hold the **USER** key, then press the **POWER** key.
   ...or while the 3460 is on, press USER and POWER simultaneously.
2) The first item of the Setup Menu is “Func1”. Scroll to “totaL” with the **USER** key.
3) To setup the Total Mode, press **TARE**. The current Total Mode setting is displayed.
4) Select the Total Mode by scrolling through the choices with the **USER** key.
   In this example, we’ll set the Total Mode to the Auto-High mode. The Auto High mode uses the highest stable reading as the total value, and totals when the load is removed.
5) When the desired Total Mode setting is displayed, press **TARE**. The next item in the Setup Menu appears.
6) Either press **ZERO** to exit Setup and store all changes, or continue to another Setup Menu item using the **USER** Key.

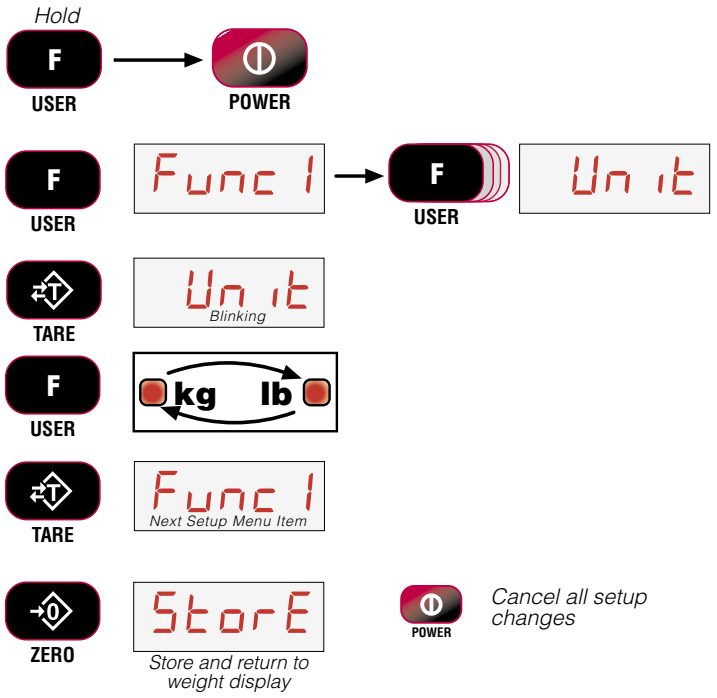


UNITS

Units can be changed in two ways. 1) program a User Function key to Units, or 2) change the units with the setup menu with the following procedure. Note that OIML LFT scales do not allow units to be changed.

Units Setup

1) With the 3460 off, press and hold the **USER** key, then press the **POWER** key.
   ...or while the 3460 is on, press USER and POWER simultaneously.
2) The first item of the Setup Menu is “Func1”. Scroll to “Unit” with the **USER** key.
3) To setup the weight units, press **TARE**. The display will blink “Unit”.
4) Change the weight units by pressing the **USER** key. The unit is indicated by the annunciators.
5) When the desired unit setting is annunciated, press **TARE**. The next item in the Setup Menu appears.
6) Either press **ZERO** to exit Setup and store all changes, or continue to another Setup Menu item using the **USER** Key.

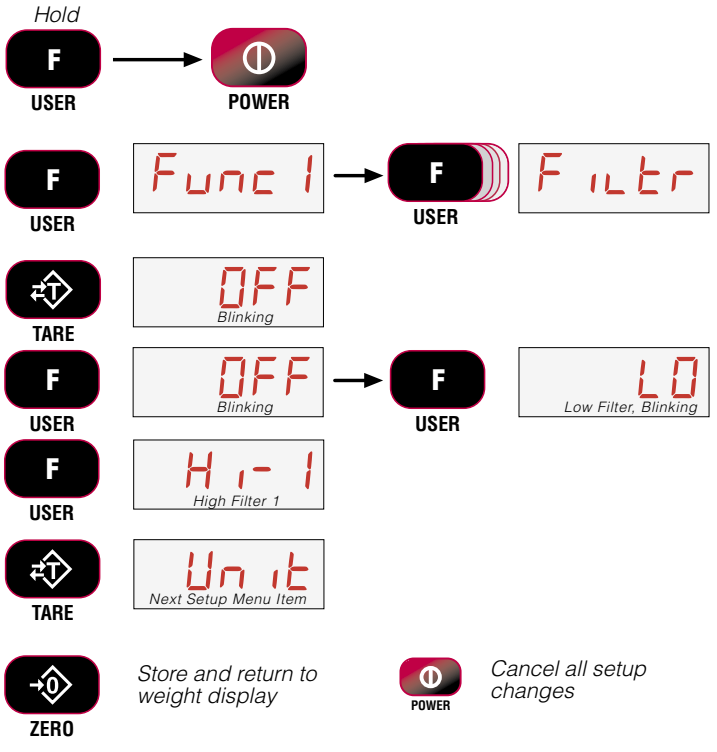


FILTER SETUP

Changing the filter settings allows the scale to adjust to situations where there is a lot a movement in the structure. If the reading is not stable, it can often be improved by increasing the filter setting. Settling time will be longer as the filter setting is increased. However, the MSI-3460 employs algorithms that speed up large weight changes while still controlling vibration even with high filter settings.

Filter Setup

1) With the 3460 off, press and hold the **USER** key, then press the **POWER** key.
   ...or while the 3460 is on, press USER and POWER simultaneously.
2) The first item of the Setup Menu is “Func1”. Scroll to “Filtr” with the **USER** key.
3) To setup the filter, press **TARE**. The display will blink the current filter setting.
4) Change the filter setting by pressing the **USER** key.
   There are four available filter settings. Not all choices are shown in this example.
5) When the desired filter setting is annunciated, press **TARE**. The next item in the Setup Menu appears.
6) Either press **ZERO** to exit Setup and store all changes, or continue to another Setup Menu item using the **USER** Key.



SECTION 5 – CALIBRATION

The 3460 is calibrated using standard weights. It is required that the weight used is at least 20% of full capacity in order to achieve rated accuracy. For example, use at least a 1000kg test weight to calibrate a 5000kg capacity scale.

When adequate test weights are not available, the 3460 can be calibrated using offset resistor calibration which is referred to as R-Cal. To use R-Cal, a factory generated R-Cal number must be known. MSI supplies replacement load cells for the 3460 with the R-Cal value stamped on the serial number label.

There are three aspects of calibration: 1) Standard Calibration – is used for maintenance and routine calibration. 2) Initial Calibration – is used to setup both the capacity and resolution (d) of the scale. It differs from Standard Calibration only in the initial steps. Initial Calibration is performed after a Calibration Reset which completely erases the calibration and setup memory. 3) R-Cal – If R-Cal values are known, the scale can be calibrated without weights.

STANDARD CALIBRATION

Use this procedure for the routine calibration of the 3460

Standard Calibration Procedure

1) Remove the seal screw. With a small screwdriver press the Cal Switch behind the seal screw.

The CAL Setup Menu appears.

2) Press **TARE** to Start the Calibration Procedure.

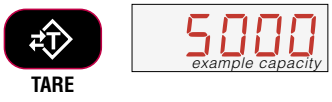
3) The display reads “UnLd” (unload) indicating you should remove all weight from the hook.

4) Press **TARE**. The 3460 sets the zero calibration point.

5) If the zero is in range, the scale will display “PASS”. Then “LoAd” is displayed.

6) Load the scale with a test weight. *For highest accuracy, a test weight of 20% of capacity or more is recommended.*

7) Press **TARE**. The 3460 flashes the capacity. If you are loading the scale with the capacity weight, skip to step 10.



8) To enter a calibration weight other than capacity, press USER. The display far left digit will flash zero indicating that a number should be entered.

*Error Correction: If you input a wrong value, press **ZERO** to step back one digit and reenter.*

9) Press the **USER** key to scroll the number and the **TARE** key to enter each digit of the calibration weight.

*In this example, we'll enter 2500 kg on a 5000 kg capacity scale. Do not push the **TARE** key two times in a row.*

*To add a decimal point, push the **POWER** key while the number is blinking.*

10) When the entire value of the test weight is displayed and the weight and scale are stable, press **TARE** to finish off the weight entry. If the resultant cal value is within limits, the display will read "PASS" followed by "CAL'd".

To achieve the highest accuracy R-Cal value, unload the scale before proceeding to step 11. Unloading does not effect the accuracy of the calibration.

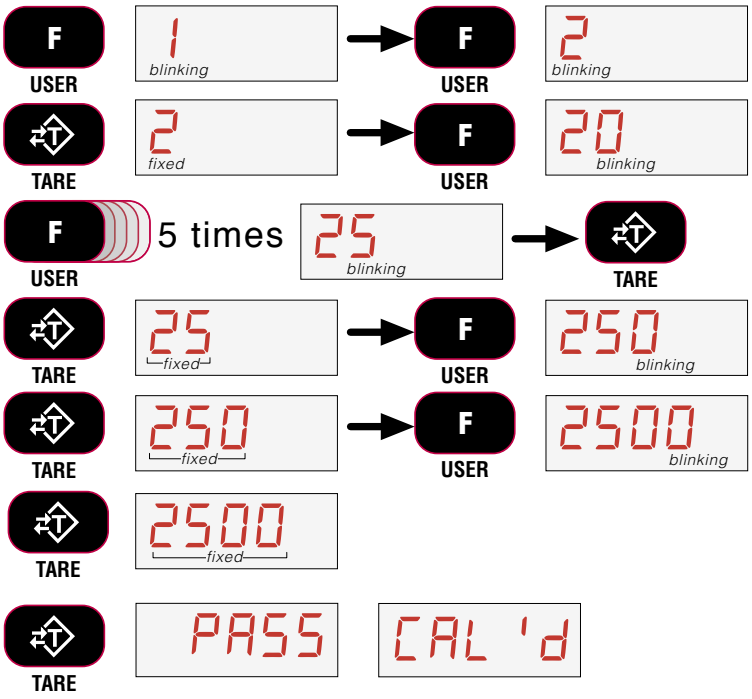
11) Press **TARE**. The R-Cal value is calculated and displayed for approximately 8 seconds.

12) Press **ZERO** to store the calibration constants, or after 8 seconds,the calibration constants will automatically store. After the Store message is displayed, the scale goes to the next item on the Cal Menu, "r-Cal".

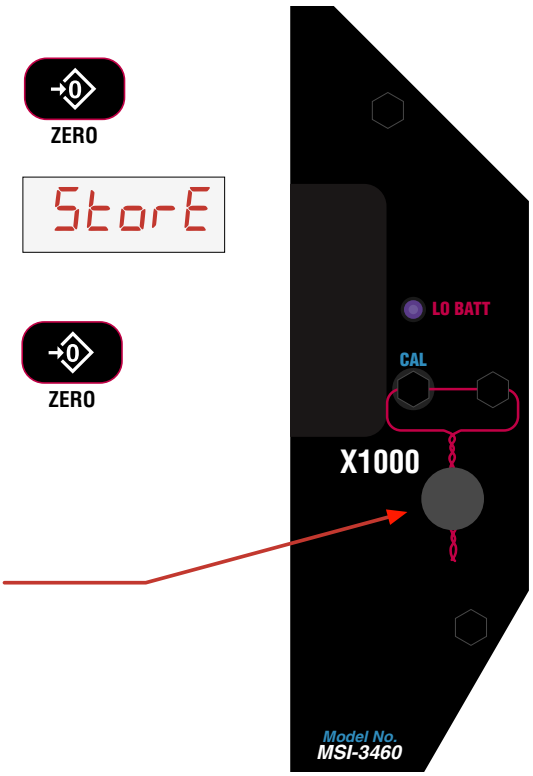
13) Press **ZERO** to go to the standard weight display and the 3460 is ready for use.

You can cancel calibration by pressing Power and the scale will reset to the previous calibration constants.

14) After ensuring the calibration is acceptable, replace the Hex Seal Screw. If the scale is being used as a Legal-For-Trade device, place a Lead-Wire Seal through the Cal Screw over to the adjacent screw.



Example Value only.



INITIAL CALIBRATION

Use this procedure only if the capacity and count-by (d) needs to be modified. The initial steps of the initial calibration will totally erase user setups as well as any previous calibration.

Initial Calibration

Resetting Capacity and Countby (d)

1) Turn the 3460 off.

2) Remove the seal screw. With a small screwdriver press and hold the **CAL** Switch behind the seal screw.

3) Still holding down the **CAL** switch, press the **POWER** switch.

4) The display blinks “rESEt”.

5) To reset all calibration constants and setup parameters, press **TARE**.

6) The 3460 requests a confirmation by displaying “Sure?”. *To cancel the Reset press the POWER key.*

7) To complete the reset, press **TARE**. The Calibrate menu appears. You must now recalibrate the system.

8) Press **TARE** to start the initial calibration procedure. The display shows "Unit". You select the units you wish to calibrate in.

9) Press TARE to select the calibration unit.

10) Use the **USER** key to choose between lb and kg. When the desired unit is shown, press **TARE**.

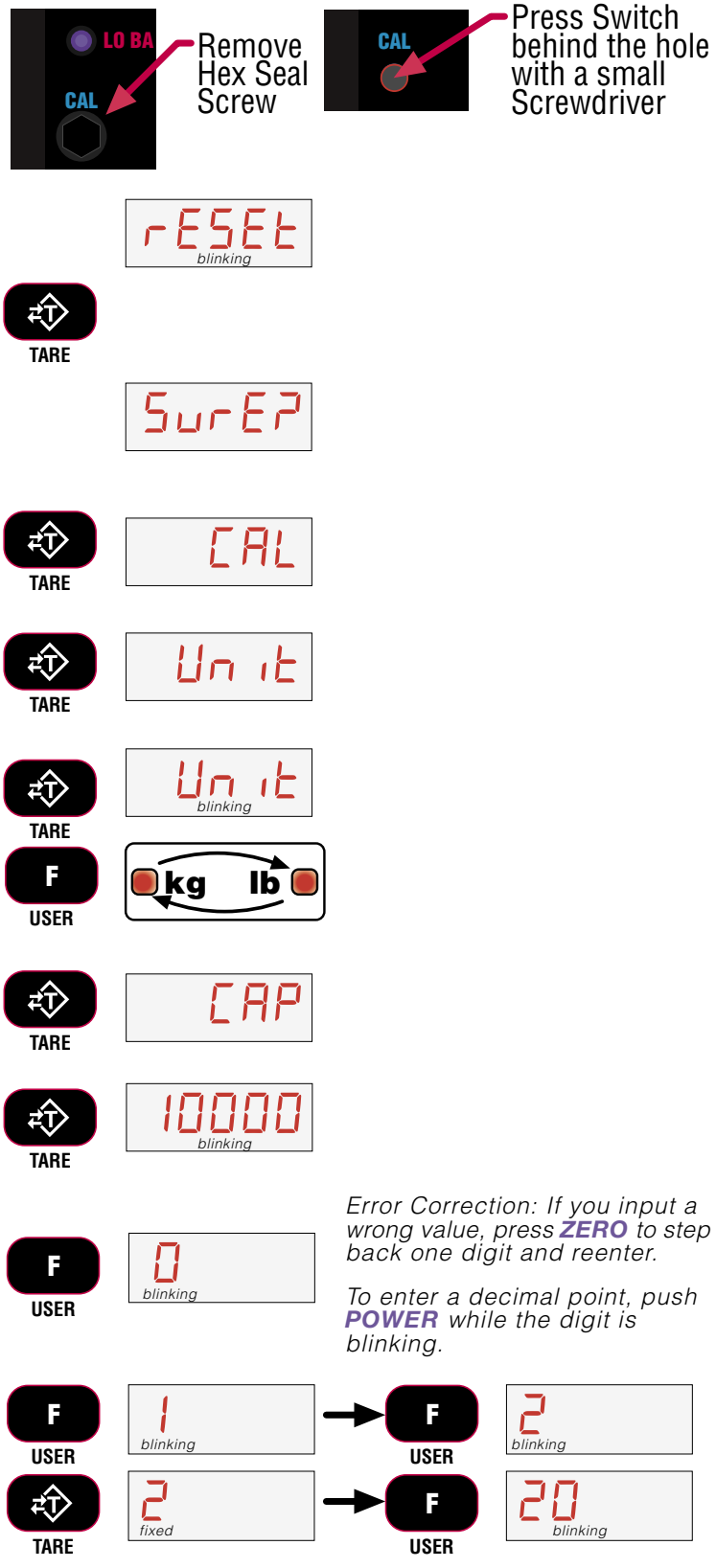
11) Next, set the capacity in the selected units. Capacity must be set no higher than the load cell rated capacity.

12) Press **TARE** to enter the capacity setting screen. A capacity of 10000 is the initial value. *If 10000 units is the desired capacity press TARE and skip to step 16.*

13) To change the capacity, press **USER**.

14) The first digit blinks. Use the **USER** key to scroll through the numbers. When the desired number is shown, push **TARE**.

In this example, we’ll enter 2500 as a capacity.



*Error Correction: If you input a wrong value, press **ZERO** to step back one digit and reenter.*

*To enter a decimal point, push **POWER** while the digit is blinking.*

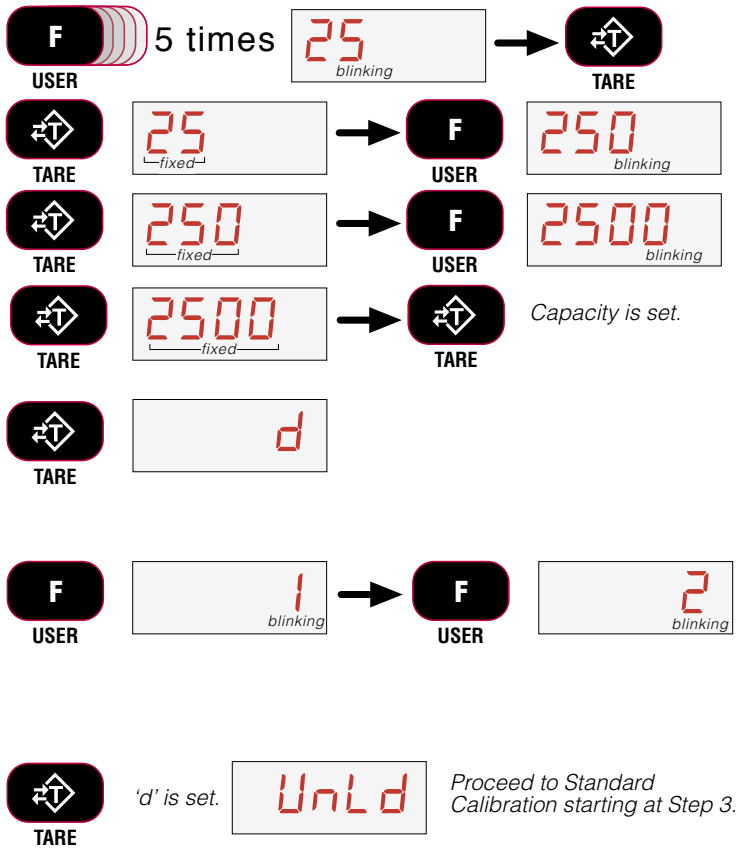
Continue inputing the desired capacity using the **USER** key for scrolling the number and the **TARE** key to store the number.

15) Finalize the capacity value by pressing the **TARE** key on an unblinking display. In our example, once the number 2500 is fixed on the display, press **TARE** to store the capacity value.

16) Next the scale division size 'd' is set. Press **TARE** to begin. *In this example we'll set the 'd' to 2 units.*

17) Use the **USER** key to scroll through the recommended scale divisions. *The first 'd' offered is the standard division for the given capacity. Setting a 'd' size that results in total resolution higher than 1:5000 is not recommended for stability reasons.*

18) When the desired scale 'd' is displayed, press **TARE**. The "UnLd" display appears and the scale is ready for calibration. Follow the Standard Calibration procedure starting at step 3.



GUIDELINES FOR CAPACITY AND RESOLUTION

Crane Scales are subject to forces that regular floor scales do not see. Many bridge cranes, hoist cranes, and mobile cranes lack rigidity and tend to bounce or swing when loads are lifted. For this reason, MSI recommends that resolution is kept in the 1:2000 to 1:3000 range. Some improvement in stability can be achieved by increasing the filtering. However, you should never program resolution that is far greater than you need. If the MSI-3460 display is never stable, it is recommended that the resolution is reduced as well as filtering increased.

Due to LFT requirments and general scale design criteria, the weight must be stable for certain features to work: ZERO – Weight must be stable to be Zeroed. TARE – Weight must be stable to be Tared. TOTAL – Weight must be stable to be added to the total registers. One way to improve the stability is to increase the filtering, at the risk of increasing settling time. The other is to increase the 'd' (reduce resolution). The third way is to increase the "Motion Window". The MSI 3460 defaults to ±1d as a motion window. It can be changed at MSI to a higher value if desired. Often ±3d is chosen for bridge cranes as these tend to have a lot of bounce to them. This of course carries an accuracy penalty adding ±3 d to the total accuracy of the scale if the zero or tare operation happens to capture the weight in a valley or peak.

Setting capacity is dictated primarily by the capability of the load cell. MSI supplies the MSI-3460 in many capacities. ***NEVER SET THE CAPACITY OF THE SCALE HIGHER THAN THE RATING OF THE LOAD CELL.*** Due to excellent linearity of the MSI S-Beam load cell, it is acceptable to set lower capacities to better match the crane the MSI-3460 is used on. For example, if the hoist is rated for 9000 lb. you can use an MSI 10000 lb. MSI 3460 and reset the capacity to 9000 lb. so that the Scale will indicate overload at 9000 lb. instead of 10000 lb. Derating as much as 50% of the capacity is usually acceptable, but the scale may be less stable if the 'd' is decreased.

Note that the capacity of all the MSI-3460 systems is rated approximately 20% higher than the rated capacity in pounds. This is to allow the kg capacity to be exactly 1/2 the number of the pounds capacity.

R-CAL CALIBRATION

When adequate test weights are not available, the 3460 can be calibrated using offset resistor calibration which is referred to as R-Cal. To use R-Cal, a factory generated R-Cal number must be known. MSI supplies replacement load cells for the 3460 with the R-Cal value stamped on the serial number label. When a calibration is performed with test weights, a new R-Cal is generated.

ATTENTION! The R-Cal number must be known prior to starting this procedure. For a MSI-3460 with its original Load Cell, MSI prints this number on the Calibration Record, the Serial number tag, and on the calibration log found inside the battery compartment. R-Calibration reduces slightly the absolute accuracy of the system and is intended for non-critical use only. LFT requires that the MSI-3460 is calibrated using test weights.

R-Cal Calibration Procedure

1) Remove the seal screw. With a small screwdriver press the Cal Switch behind the seal screw.

The CAL Setup Menu appears.

2) Press the **USER** key to scroll to the R-Cal menu selection.

3) Press **TARE** to Start the R-Cal Procedure.

4) The display reads “UnLd” (unload) indicating you should remove all weight from the hook.

5) Press **TARE**. The 3460 sets the zero calibration point.

6) if the zero is in range, the scale will display “PASS”.

7) Next the display reads “rCAL.?” to ask that you look up the R-Cal value to be used.

8) Press **TARE**. The 3460 reads the R-Cal with the current calibration. If the displayed R-Cal value is correct, skip to step 11.

9) To enter an R-Cal value other than the offered value, press **USER**. The display far left digit will flash zero indicating that a number should be entered.

Go to Index

10) Press the **USER** key to scroll the number and the **TARE** key to enter each digit of the R-Cal value.

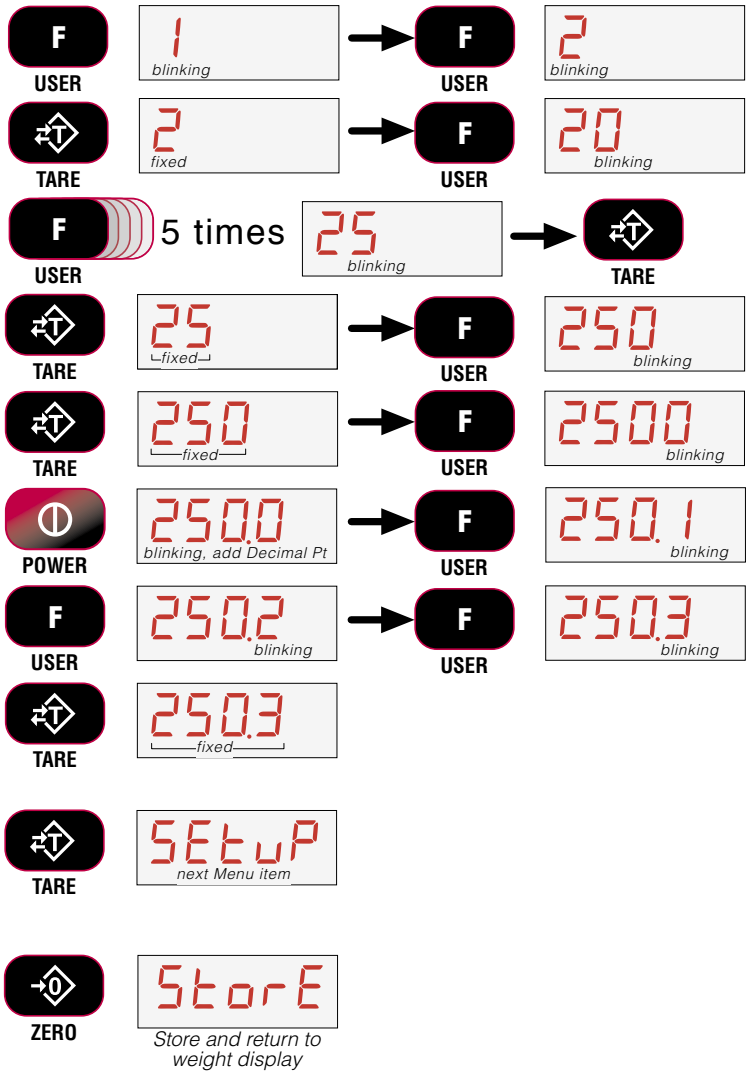
*In this example, we'll enter 250.3 kg on a 1000 kg capacity scale. Do not push the **TARE** key two times in a row until the entire number is entered. R-Cal's less than 5% of capacity will not be accepted.*

*To add a decimal point, push the **POWER** key while the number is blinking.*

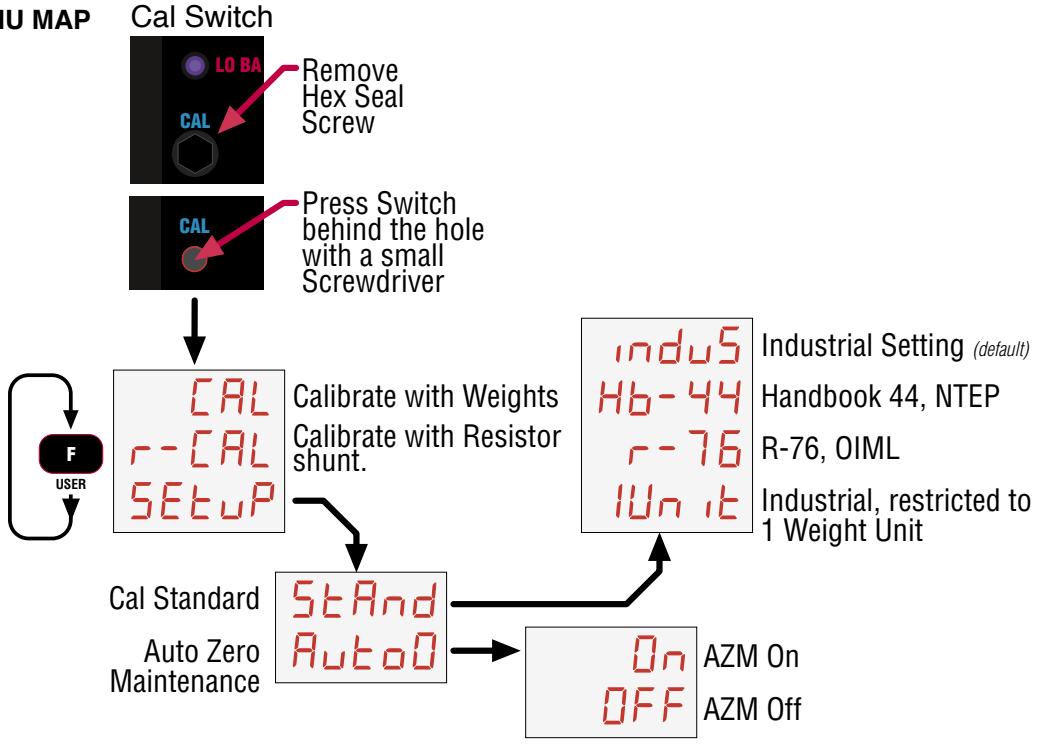
*Error Correction during number entry: If you input a wrong value, press **ZERO** to step back one digit and reenter.*

11) Once the entire number is entered (not blinking) press the **TARE** key to complete the entry of the R-Cal value.

12) R-Cal is complete. The next Cal Setup menu item appears. Push ZERO to store the calibration and return to scale operation.



CALIBRATION SETUP MENU MAP



CALIBRATION SETUP MENU

The Calibration Setup Menu contains two items: Standard and Auto Zero Maintenance "Auto0". In addition, more menus will appear that are transfered from the Main Setup Menu when Legal-for-Trade settings are used.

STANDARD

There are 4 selections in the standards menu.

1) Industrial (indu5) – This is the most common setting for the 3460. With the Industrial standard, you have full range zero, access to units switching, filters, and peak hold.
2) Handbook 44 (Hb-44) – Sets the scale to enable only approved features per the NTEP HB-44 rules and regulations. Access is denied to Peak Hold, and the zero range may be limited. The Filter menu is moved to the Cal Setup Menu, so filters are only accessible through the Cal Seal.
3) R-76 (r-76) – Sets the scale to enable only approved features per OIML R-76. Only kg weight units are available. The zero range is limited to 5% (-2 +3% relative to Calibrate zero). Net/Gross function is temporary. Once Net weight is established, pushing an F key set for Net/Gross will cause a maximum 5 second display of the Gross weight. You must clear the Tare to display Gross weight constantly. Other metrological aspects are changed to meet R-76 requirements.
4) One Unit (1unit) – The one unit Standard is exactly the same as Industrial, except units switching is inhibited. This is useful for Metric only countries. Another use of the One Unit standard is to allow the scale to be calibrated in units other than lb or kg, since conversions are eliminated.
   Contact MSI for more information on the Standards settings.

Weight Standard Setup

If you are already in the Cal menu skip to step 2

1) Remove the seal screw. With a small screwdriver press the Cal Switch behind the seal screw. The CAL Setup Menu appears.
2) Press the **USER** key to scroll to "Setup" .
3) Press **TARE** to enter the Cal Setup Menu.
4) Press **TARE** to enter the Standard Menu. The current standard setting is displayed.t
5) Scroll to the desired standard using the **USER** key. .
6) Press **TARE** to set the standard. The display goes to the next item in the CAL Setup Menu.
7) Either press **ZERO** twice to exit Setup and store all changes, or continue to another Setup Menu item using the **USER** Key.

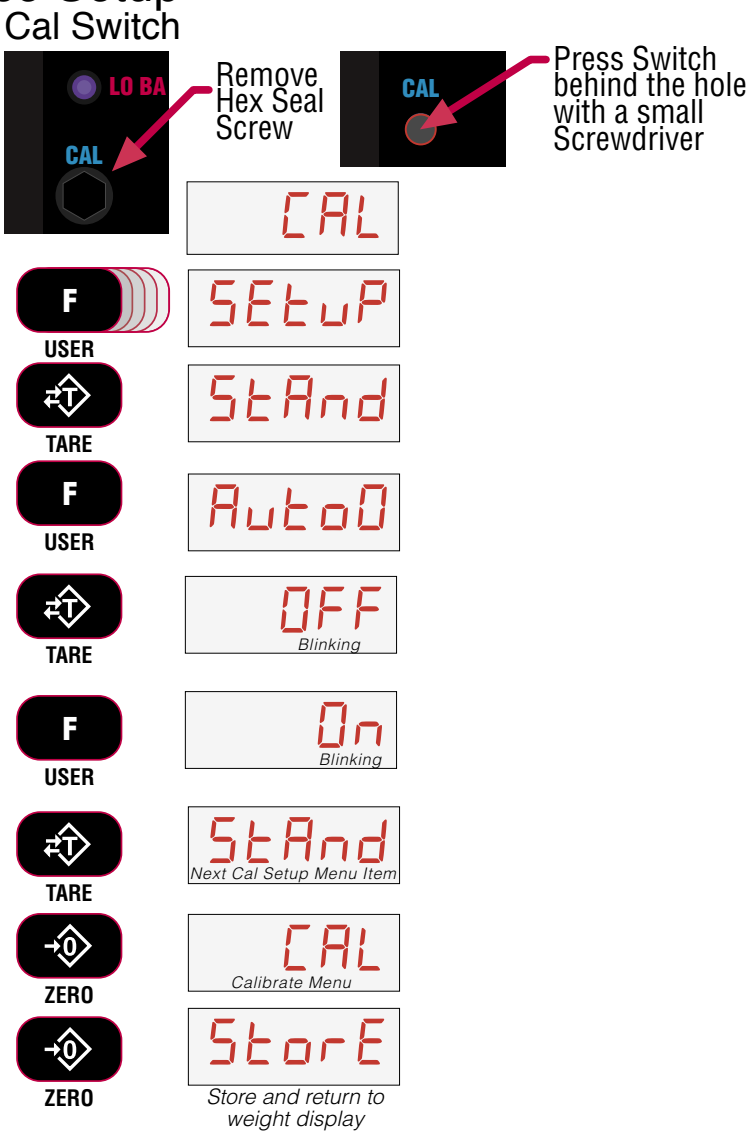
AUTOZERO MAINTENANCE

The 3460 employs an autozeroing maintenance mechanism to adjust the zero reading to the Center-of-Zero (COZ) COZ is defined as the weight reading is within 1/4 ‘d’ of zero. AZM continuously adjusts zero to maintain COZ. It is recommended that AZM is on to maintain the highest accuracy. However, there are circumstances when it should be turned off. This can happen when minor variations of weight occur while picking up scale attachments and the variations fall within the AZM capture window. The AZM capture window (usually 1 ‘d’) and capture time (usually 8 seconds) can be adjusted by MSI to meet custom requirements. The settings of AZM are dictated in Legal-for-Trade Standards and cannot be adjusted.

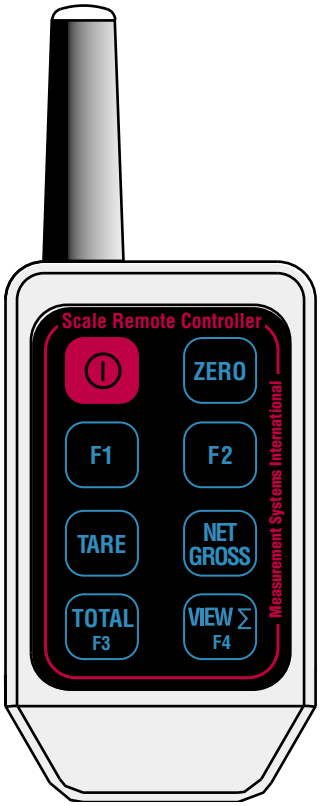
Auto Zero Maintenance Setup

If you are already in the Cal menu skip to step 2

1) Remove the seal screw. With a small screwdriver press the Cal Switch behind the seal screw. The CAL Setup Menu appears.
2) Press the **USER** key to scroll to ”Setup” .
3) Press **TARE** to enter the Cal Setup Menu.
4) Press **USER** to scroll to the “Auto0” menu.
5) Press **TARE** to enter the Auto-Zero Menu. The current setting is displayed (blinking)
6) Change the setting between On or OFF using the **USER** key.
7) Press **TARE** to set the Autozero. The display goes to the next item in the CAL Setup Menu.
8) Either press **ZERO** twice to exit Setup and store all changes, or continue to another Setup Menu item using the **USER** Key.



SECTION 6 – RF REMOTE CONTROL OPTION



DESCRIPTION

MSI-3460 Series RF Indicators can be equipped with an RF Remote Control (RFRC). The RFRC is a transmit only device that can be used to perform basic scale functions. The default switch functions can be changed in the Function Key menus and used for any MSI-3460 programmble functions. Range will vary from 25' to 100' (50' typical) depending on room conditions and line of sight to the display. The remote receiving antenna is behind the red lens of the meter and best range will occur when the display is visible to the operator using the RFRC.

The RFRC provides the ability to turn the MSI-3460 on remotely. The RFRC is available in three versions differing only in transmit frequency. The standard USA version operates at 418MHz. Available alternative frequencies are 315MHz and 433MHz primarily for use in countries other than the USA.

FUNCTIONS

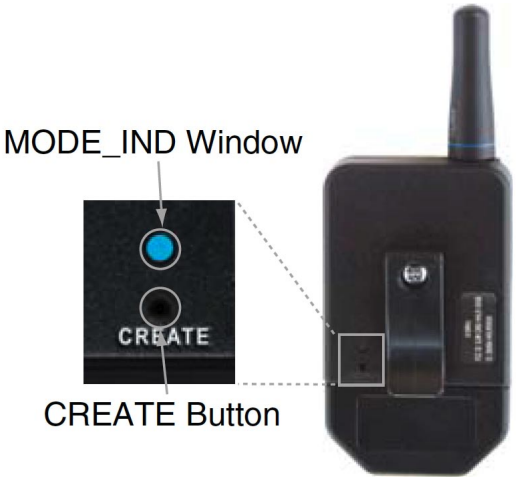
The default functions of the RF Remote control duplicates the functions of the front panel keys on MSI-3460 RF Indicator. The POWER, ZERO, NET/GROSS, TARE, TOTAL, and VIEW TOTAL keys function identically. The TOTAL still must be enabled and configured in the MSI-3460 before the Total features will function properly.

The F1 key corresponds to the USER key on the 3460 front panel. The F2 key is unique to the remote and the function is set using the Func2 setup menu.

When a successful transmission is achieved, the ACK blue light will illuminate on the MSI-3460 front panel.

SETTING THE TRANSMITTER ADDRESS

The MSI RF Remote Control Transmitter allows the selection of one of 16,777,216 (2^{24}) unique addresses. All transmitters are supplied set to the same address. To avoid contention with other units or to create unique relationships, the address should be changed. This is accomplished by using a paper clip or probe to press the CREATE button on the board through the hole in the back of the case.



1) Press the button and a LED will light up in the MODE_IND window, indicating that the address is being created. The address will be randomized for as long as the button is held down.

2) Release the button and the randomized address will be saved and the LED will begin flashing to indicate that the Control Permissions may now be set.

3) Press all the buttons one by one that the transmitter will have the authority to access. Press the CREATE button with the paper clip again or wait 17 seconds for it to time out. The address and Control Permissions are now set.

SETTING THE RECEIVER ADDRESS

Once the transmitter is setup, you must now program the corresponding MSI-3460 to match. The steps are:

1) Program the F1 key to "LEARN" (See the function key setup procedure). You can also remove the battery from the MSI-3460. Then the "LEARN" mode will start when the battery is plugged back in.

2) Start LEARN by pressing the **USER** key on the 3460 front panel (or plug in the MSI-3460 battery).

3) Press each key on the Transmitter that you plan to use. During the "LEARN" process the ACK annunciator will blink. You must complete all button pushes before it times out in 17 seconds.

Any 3460 can learn up to 7 different remotes. However, never program multiple 3460s to the same remote since they will all respond at the same time if they are in range.

Reseting the 3460 RF Remote Receiver

1) Program the Func1 USER key to be Learn.

2) Press **USER**.

3) Press **ZERO**.

4) Reprogram the 3460 using the "Setting the Receiver Address" procedure.

CONTENTION AND JAMMING 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.

The RF Remote Control is a narrow band low power device and does not have the jamming immunity of the Spread Spectrum Modem used by the MSI-3460 to communicate to the Remote Display. Powerful sources of RF energy in the 418MHz region can jam the remote and prevent it from operating. In this circumstance, trying either of the two other available RF Remote frequencies (433MHz and 315MHz) might solve the problem. Before ordering the RF Remote Control option, some effort to research RF devices used in the immediate area would be useful in avoiding jamming the control signals.

It is the end users responsibility to confirm that the chosen operating frequency is legal for use in your location.

In spite of the potential for jamming the Remote Control, the receiver is very immune from false reception due to the 24 bit encoding. Therefore no functions will be inadvertantly executed.

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. Once the new battery is installed, both the transmitter and MSI-3460 will have to learn new addresses. Follow both procedures for setting addresses.

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, if not installed and used in accordance with the instructions, may cause harmful interference to radio 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

APPENDIX A –TROUBLESHOOTING

Problem	Possible Cause	Solution
Display is blank when POWER button is depressed.	A) Discharged battery	Recharge, allow at least 4 hours charge
	B) Defective battery	Replace
	C) Corroded battery or battery contacts	Clean contacts
	D) Defective Switch or circuit board	Requires Authorized Service
Display does not function properly or front panel button do not function normally or scale will not turn off.	A) Improperly updated software	Reinstall software
	B) Faulty Circuit Board	Requires Authorized Service
	C) Loose connectors	Requires Authorized Service
Scale does not respond to weight changes	A) Out of calibration	Calibrate
	B) Faulty Load Cell	Replace
	C) Load cell connector	Check connector and wires
Display over ranges below 100% of capacity	A) Tared weight is added to load to determine overload point.	Return to Gross weight mode
	B) Zero requires adjustment	Rezero the scale
	C) Too much weight has been zeroed	Rezero the scale
Display drifts	A) AZM (Auto0) is turned off	Turn AZM on
	B) Rapid Temperature changes such as moving the scale from indoors to outdoors.	Wait until the scale temperature has stabilized.
Displayed weight shows large error	A) Scale not zeroed before load is lifted	Zero the scale with no load attached
	B) lb/kg units causing confusion	Select proper units
	C) Requires recalibration	Recalibrate
Display reading not stable	A) Excessive Vibration in crane system	Increase filtering or increase ‘d’ in Cal.
	B) Excessive side loading	Improve load train symmetry
	C) Load Cell faulty	Check LC connections
Display toggles between “Error” and “Load”	A) Weight exceeds capacity	Reduce weight immediately
	B) Faulty Load Cell or wiring	Check LC and LC wiring.
Display toggles between “Error” and “A2DLo”	A) A/D is saturated negative	Check LC and LC wiring
Display toggles between “Error” and “buttn”	A) A key is stuck or is being held down	Check switches for damage.
		Ensure that a remote is not transmitting continuously.
RF Remote does not work	A) Units not mated.	See setting the Transmitter and receiver address procedures
Some RF Remote keys do not work but the ACK light blinks.	A) Keys were not enabled during the setup process	Enable keys by running the transmitter and receiver address procedures
Lo Batt is blinking	A) Battery is low	Recharge Battery
Unit turns on, then immediately off	A) Battery is low	Recharge Battery
Weight will not zero	A) System not stable	Wait for motion light to turn off
		Increase filtering for more stability.
	B) Zero out of range	LFT units have limited zero range. Reduce the weight or use Tare instead

Problem	Possible Cause	Solution
Weight will not Tare or Total	A) System is not Stable	Wait for motion light to turn off, or if in a mechanically noisy crane, increase the filtering or reduce the size of the scale increment "d'. It is also possible to increase the motion window. Contact MSI if you have a problem getting the 3460 to zero, tare, or total due to stability issues.
Set Point Lights Blink	A) Set Point is enabled and the trigger point has been reached.	Disable set points if they are not needed.
Manual Total does not work	A) A Function key is not set to "Total" B) Weight must be stable	Set up Func1 or Func2 for "Total" Increase filtering for more stability.
Auto Total does not work	A) Weight must be stable B) Weight thresholds not reached	Wait for the motion light to go out, or Increase filtering for more stability. You must exceed 1% of capacity for autototal to work. Then you must drop below 0.5% of capacity for additional weighments to register.

SERVICE COUNTERS

The MSI-3460 maintains two service counters for safety. The first counter counts the number of times the scale has been overloaded. The 2nd counter counts lifts above 25% of capacity. These counters serve to warn the user to inspect the load train after a number of overloads, and inspect the load train when there is a chance of fatigue failure. Service counters can only be reset by the factory. The power up routine will be interrupted when the lift counter exceeds 16383 lifts or the overload counter exceeds 1023 overloads. Push any key to continue operation.

To access the service counters:

1) Program a User Function key to be TEST. (see function key setup)
2) Press **TEST** (**USER**).
3) Within 2 seconds of pressing the TEST (USER) key, press **TARE**.
4) The display flashes "LFCnt" (for Lift Counter) followed by the number of times the weight has exceeded 25% of capacity.
5) Press **TEST** (**USER**). The display flashes "OLCnt" (for Overload Counter) followed by the number of times the weight has exceeded capacity.
6) Press **TEST** (**USER**). The display flashes the R-Cal value.
7) Press **TEST** (**USER**). Returns to standard weighing mode.

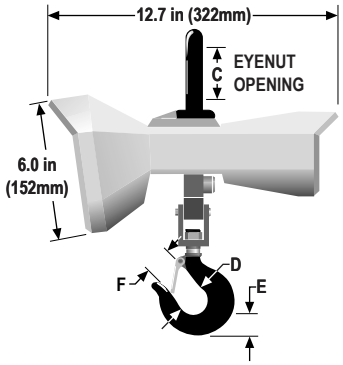
Only an MSI factory representative can reset the service counters, as these are an inportant safety warning feature. Depending on the circumstances, a thorough load train inspection might be necessary to ensure user safety.

Reference MSI's "Crane Scale Safety and Periodic Maintenance Manual" (Pub.243-08-94D) for proper loading techniques to improve the safety and longevity of your MSI-3460 Crane Scale. This publication is available at www.msiscales.com and is included in the CD shipped with your Crane Scale.

APPENDIX B

MSI-3460 Challenger 3 Dimensions

FRONT VIEW



SIDE VIEW

Note: 15,000 lb. (7,500 kg) unit comes standard with 12 ton top shackle.

Capacity	Resolution	A	B	C	D	E	F	Approximate Shipping Weight
250 lb 125 kg	0.1 lb .05 kg	11.94 in 303 mm	2.0 in 51 mm	2.45 in 62 mm	1.63 in 41 mm	1.14 in 29 mm	1.16 in 29 mm	22 lb 10 kg
500 lb 250 kg	0.2 lb 0.1 kg	11.94 in 303 mm	2.0 in 51 mm	2.45 in 62 mm	1.63 in 41 mm	1.14 in 29 mm	1.16 in 29 mm	22 lb 10 kg
1,000 lb 500 kg	0.5 lb 0.2 kg	11.94 in 303 mm	2.0 in 51 mm	2.45 in 62 mm	1.63 in 41 mm	1.14 in 29 mm	1.16 in 29 mm	22 lb 10 kg
2,000 lb 1,000 kg	1.0 lb 0.5 kg	11.94 in 303 mm	2.0 in 51 mm	2.45 in 62 mm	1.63 in 41 mm	1.14 in 29 mm	1.16 in 29 mm	22 lb 10 kg
5,000 lb 2,500 kg	2.0 lb 1.0 kg	16.67 in 423 mm	2.45 in 62 mm	3.40 in 86 mm	2.5 in 64 mm	1.81 in 46 mm	1.61 in 41 mm	39 lb 18 kg
10,000 lb 5,000 kg	5.0 lb 2.0 kg	16.67 in 423 mm	2.45 in 62 mm	3.40 in 86 mm	2.5 in 64 mm	1.81 in 46 mm	1.61 in 41 mm	39 lb 18 kgs
15,000 lb 7,500 kg	5.0 lb 2.0 kg	21.65 in 550 mm	3.25 in 83 mm	4.28 in 109 mm	3.00 in 76 mm	2.26 in 57 mm	2.08 in 53 mm	56 lb 26 kg

Consult factory for higher capacities

THE MSI LIMITED WARRANTY

MEASUREMENT SYSTEMS INTERNATIONAL, INC., WARRANTS load sensing elements and meters 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 pre-paid.

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 judgment and disposition of all claims will be made by MEASUREMENT SYSTEMS INTERNATIONAL, INC.

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